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MODEL AIRPLANE NEWS

'S PREMIER R/C MODELING MAGAZINE

The Classic SWIFT!

Basics of R/C

Build the LIBERTY SPORT Bipe

All About FUEL SYSTEMS

Free Poster Inside!

Cox TURBO SCORPION R/C Car Review

0 71896 48120 07

JULY 1986 VOLUME 113, NUMBER 1

MODEL AIRPLANE NEWS

ON THE COVER/CENTERFOLD: Like the '55 Corvette and the '57 T-Bird, classics will always have a place in our hearts. So it is with the beautiful Swift, the airplane judged by private pilots as one of the most desirable to own. The Swift on the cover is the extremely rare and completely original GC-1A. Restored to flawless condition by owner Mark Holliday, it is a consistent award winner at antique fly-ins. Photo taken by Budd Davisson over Fond du Lac, Wisconsin.

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Editorial

by DAN SANTICH

THIS YEAR'S MODEL TRADE SHOWS have told us a few things. Probably more than any other measure, these shows are a forecast of things to come; a barometer, if you will, of trends and interests that manufacturers have seen as a fulfillment of your desires. It was almost like looking in a crystal ball. You saw an image, yet not a strong one, at least not this year.

Sure, there were a lot of new products. Hobby Shack has at least 10 new kits, including E-Z warbirds, and a whole slew of other R/C products; Byron Originals displayed their awesome new F-20 ducted-fan kit; Craft-Air had a beautiful Rearwin speedster; several new trainers have been introduced by various manufacturers; and there were several new engines, including the four-cylinder O.S. Pegasus. But the really big boom in this hobby was not as obvious as it will be next year. At least that is my prediction. That "big boom" will be in electric-powered aircraft.

Several companies have already seen it coming and are gearing up for the onslaught.

Why electrics? Well, for one thing, the most popular R/C cars are electric. The transition from wheels to wings, with electric power, is a natural. Everyone is aware of the virtue of electrics: lack of noise. Don't get me wrong, I don't see electrics taking over completely in the power department. At least not right away. But the signs are clear. The technology is there for viable, fully-adaptable, and reasonably-priced airplanes, just as with cars, and I think we're going to see a real explosion of interest in electric airplanes in the very near future.

The biggest growth in the hobby right now is with R/C cars. Once you master them, what do you do? You go to airplanes. Since you already know about electric power and have a good grip on directional control, an electric-powered airplane is not that difficult. Like I said, it's natural and it's coming.

THIS MONTH. The Liberty Sport is probably one of the best-known biplanes around, thanks to the great Sig kit. Orval Lloyd designed a larger version from his original Liberty and called it the "B" model. Being an avid modeler, Lloyd wanted to do up a giant-scale model of his latest effort, but ill health prevented that endeavor. Good friend Roger Stern obtained all the data and dimensions from Orval and built the model presented in this issue. It's accurate to scale and makes a great flying model. For kit reviews, Rich Uravitch found that the new Hobby Shack Laser, although smaller, lacks none of the punch of its bigger brothers. Chris Chianelli discovered that electrics can be a real joy in his review of the Cox Canario. And, if you ever wondered why your engine only runs for 30 seconds and then quits, you may find the answer in my article on fuel systems.

Part of the joy of this hobby is its diversification and this issue is packed with it. We hope you like it. DBS

Airwaves

Wildcat

Last October I ordered Bob Karlson's Wildcat plane and retract gear plans. I have enclosed some pictures of the project from beginning to end. Retracts are activated by two 180° Ace servos. Another 180° Ace servo operates the flaps. The other servos are Futaba's as is the 7FC1K radio. The engine is an O.S. four-cycle FS 1.20. Weight (less fuel) is 13.75 pounds. I haven't flown the model yet.

I'm 60 years old and I've been modeling for two years. My wife gave me a *M.A.N.* subscription as a gift. I really enjoy it and look forward to reading it each month.

JAMES FEUDER
Kingsville, Missouri

R/C Airships?

Can you suggest any source of information, plans, etc., for the building of R/C airships? Thank you for your kind attention and I look forward to hearing from you.

STEVE WICKS
Cleveland, Oklahoma

Not me. How about our readers?
DBS

Engine Care

In various issues of *M.A.N.* there have been articles on engine maintenance where kerosene is recommended for washing out engines after running or prior to repair. This is definitely not recommended. The use of kerosene for washing steel or iron parts promotes rust because the solvent washes away the protective oily film and leaves the bare metal to condense the moisture in suspension.

In a pinch, white or unleaded gasoline can be used. Be sure to use in a well-ventilated area and have a fire extinguisher handy. After washing your engine with a solvent and before putting it away in storage, oil it liberally with a lubricant such as 3 in 1 Oil which contains rust inhibitors.

I hope this information will help keep more engines in service.

ALISTAIR S. FRASER
Santiago, Chile

Credit Where Credit is Due

Our story presented in the May '86 issue on the National Warplane Museum by Jim Gray contained a whopping error. Mr. Austin Wadsworth is the prime mover behind this museum, his efforts being such that we have slighted his achievements and given credit to the wrong person. The quotes we attributed to Bill Anderson should have been attributed to Mr. Wadsworth. Our apologies to Bill Anderson, Austin Wadsworth, and Jim Gray.

On top of the above, we messed up a caption in "Soaring News." The photo on page 92 of the May '86 issue stated that the model was a "Dodgson Saquila." Actually, it is a home-brew by Bob Rondeau that sports an Aquila fuselage and Sagitta wings, and a Dodgson-type linkage. *DBS*

Editor's Flight-Line Review

by DAN SANTICH

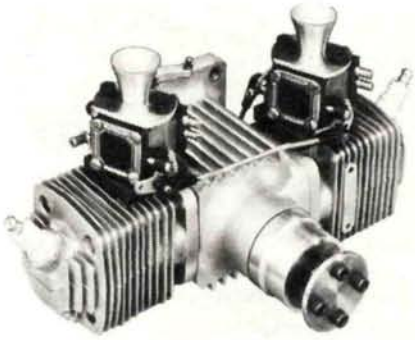
R/C VIDEO MAGAZINE

It is estimated that VCRs now occupy a place in at least half of American homes. In ten years they will be as common as the TV set itself; in fact, some sets even offer VCRs as optional equipment.

Video tapes are now available for virtually any interest, from the latest movies to deep sea fishing. Naturally, with our interest in modeling it would seem natural for someone to supply entertainment about our favorite pastime. Well, they have. R/C Video Magazine (741 17th St., Boulder, CO 80302) produces quarterly video tapes that are very professional and enjoyable. The running time averages 2 hours and each tape is packed with goodies about the hobby. For example, Volume II has coverage of the '84 QSAA in Las Vegas, a great spread on the '84 Scale Masters Championships, footage of the last Tournament of Champions, a piece on what four-stroke engines are all about, control-line combat at the Nationals, and much more. Byron's Jet Rally was in Volume IV and the Toledo Show was in Volume III.

There is enough information in each tape to keep anyone's interest level up, and use of these tapes for club meetings has been found to be a great way to keep attendance up as well. Noted modeler Jeff Troy gives building tips in each tape that can be of value to any modeler wishing to improve his technique.

These tapes will serve as a great research aid and also become highly valued as a historical record of our hobby.



EAGLE 370

The Eagle 370 by MVK Precision Model Products (P.O. Box 637, Lemont, IL 60439) is the latest entry into the giant-scale engine arena, and it's a dandy. It's a very powerful twin-cylinder, gasoline-ignition engine made in America that will set the standard by which all other gasoline model engines are judged.

This engine is made from top quality materials. The crankshaft is turned from 4340 chrome-moly steel. It runs on four main ball bearings and the rods have caged needle bearings on both ends.

The ignition system is MVK's exclusively-designed unit and has an integral advance/retard system built in. The porting for this engine is of Schnuerle design, and you can run either a straight exhaust system or tuned pipes.

The weight of this engine is only 4.5 pounds without mufflers, and the power-to-weight ratio is the highest ever achieved with a model engine. With a 20x8 prop it turned close to 12,000 rpm. A 20x10/8 yielded 10,400 rpm, a 22x8 brought 9,800 rpm, and a 22x10 gave 8,500.

Twin Del'Orto pump carbs are used and it's strongly recommended that two independent fuel lines be used, rather than a Y fitting, in order to prevent fuel starving. By the way, with the engine idled back, it would tick over at less than 900 rpm and it ran smoothly at all power settings.

If you have a model that is suffering from an anemic power situation, I highly recommend the new Eagle 370. It will turn a dog into a tiger.

CARL GOLDBERG MODELS SUPER TOTE

One thing that can be said for Carl Goldberg Models (4733 W. Chicago Ave., Chicago, IL 60651) is that they consistently come up with products to help modelers. Their kits have established an enviable reputation for ease of construction and great flight performance among thousands of modelers. Their accessory line, from retracts to control horns, includes staple items no modeler can do without.

It's appropriate then, for them to provide a way to carry the field necessities, such as starting battery, starter, tools, props, etc., to the flying field. They have done so with their great little field box called "Super Tote."

The Super Tote kit comes with a complete, illustrated, step-by-step assembly manual and a decal set. All kit parts are precisely machined and die-cut, the majority of them from plywood. All of the pieces fit exactly as they are supposed to and the assembly only takes a few hours using cyanoacrylate adhesive; no nails are required.

Since the plywood has a very open grain, a few coats of wood filler will greatly help in appearance, as well as in keeping the box from getting fuel-soaked.

The Goldberg Super Tote is a great aid to modelers and that speaks for all of their products.

Each month model products will be reviewed personally by the editor. This will be a "hands on" evaluation wherever possible and these products will receive close scrutiny under actual operating conditions. These reviews do not constitute any recommended priority over an existing product of similar design or nature, but merely reflect the use of available items from your dealer or hobby shop.

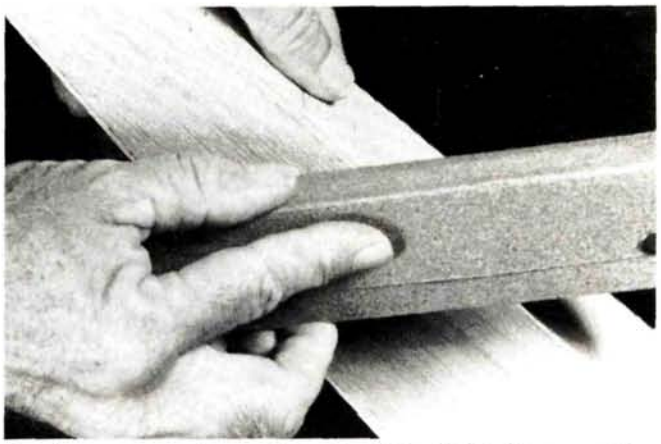
SANDPAPER

Basics of Radio Control

by RANDY RANDOLPH

IT HAS BEEN said many times that the difference between a craftsman and a hacker is sandpaper. It's a true statement because the application of sandpaper is the finishing touch that every project needs.

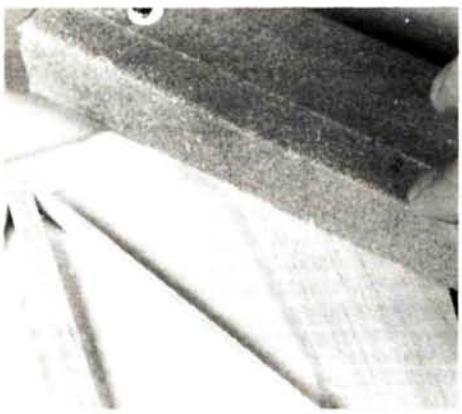
The term "sandpaper" is really a misnomer because little true sandpaper is actually used in modeling; rather, garnet or aluminum oxide is the abrasive that covers the paper rather than sand. Both of these abrasives last much longer than sand and don't leave themselves in the work as sand sometimes does. Of these two, aluminum oxide is much better; it's more expensive, but well worth the cost. For the sake of simplicity, when the terms "sandpaper" or "sanding" are used, they will refer to all three types of paper, but the preference will be for the aluminum oxide type.



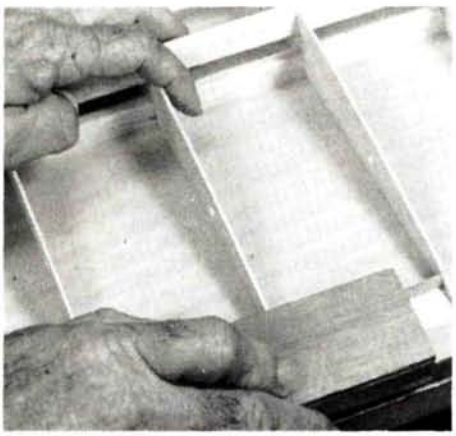
Sandpaper wrapped around a 1x2-inch block is ideal for smoothing sheet balsa fuselage sides.

Information is printed on the back of sandpapers to let you know the type of abrasive used, the grit size, and whether it's open or closed coat. The closed coat is of little use to us because it's designed to pick up and hold the sanding dust. Open coat is designed to release the dust and continue to work. Most of the sandpaper sold is of the open coat variety, but it's a good idea to make sure.

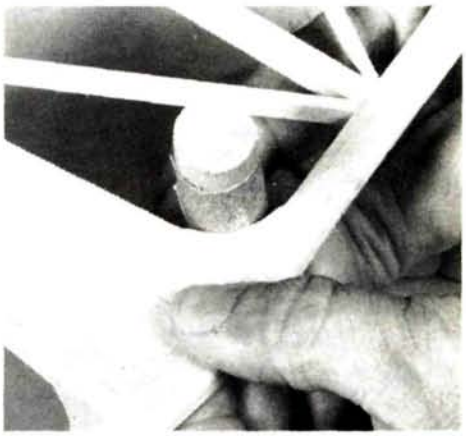
The most obvious difference in sand-



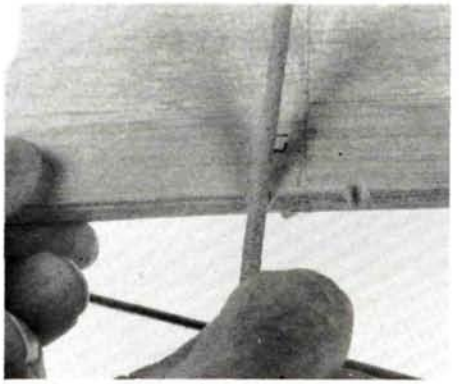
A sanding block wrapped with 150-grit paper is the proper tool for smoothing and shaping open structures.



When sanding wings, blend the leading and trailing edges into the airfoil.



Sandpaper wrapped around a dowel is used for fillets and various inside curves.



Sandpaper wrapped around wire works like a round file.

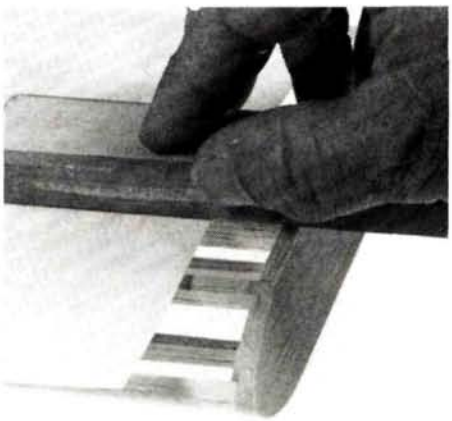
paper is in the size of the grit that makes up the abrasive. In modeling we use the sizes between 80 and 600. The larger the number, the finer the grit. Shaping is done with 80, 100, and 150 grits, and finishing with 320, 400, and 600 grits. The 400 and 600 sizes are usually in "wet-or-dry" format so they can be used for finishing painted surfaces as well as wood. When wet, they act as closed coat paper and give a polished finish to the paint.

To get the most from sandpaper, back it up with a somewhat flexible substance, such as a block of wood. A 1x2 purchased at the local lumber yard can be cut into several 12-inch lengths and each wrapped with a different grit of sandpaper. This type of block is quite useful for the general sanding of completed structures prior to covering. The sandpaper can be held in place on the block with thumbtacks for easy replacement.

Other types of sanding blocks can be made by wrapping the sandpaper around hardwood dowels of different sizes for sanding the inside of curves, such as gussets or fairings. A single piece of sandpaper glued to a thin strip of wood is good for hard-to-get-at places. Make the tool to fit the job.

As a rule, all sanding should be done with the grain of the wood rather than across it. An exception to this rule is when using a sanding block to shape or carve. Cowlings and fairings respond well to shaping with sanding blocks, but after the shape is acquired, the "with the grain" rule should be reinstated.

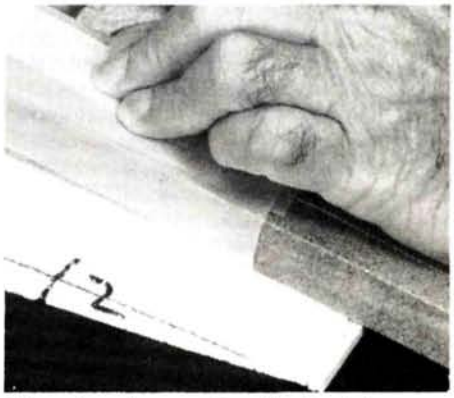
When a structure is finished, the first sanding should be done with a block and 100-grit sandpaper to smooth any glue bumps or high places in the joints. The leading and trailing edges of the wings and tail surfaces, as well as the fuselage, should be shaped and smoothed with all edges rounded. Use long, smooth strokes and let the paper do the work. It isn't necessary to apply any pressure other than the weight of the block. Brush or blow any sanding dust from the work as you go along and occasionally dust the sandpaper with a paintbrush to remove anything that might adhere to the grit. Don't be in a hurry; enjoy the feel of the abrasive cutting and smoothing the wood.



Bond paper can be used to protect areas that don't need to be sanded.

Follow the 100-grit paper with 150-grit and sand in the direction of the airflow over the surface or part. When sanding the wing, sand from leading edge to trailing edge with the sanding block span-wise so several ribs are covered at the same time. Again, use long, smooth strokes and don't hurry. Sanding takes very little time compared to the time spent in construction and pays large dividends when the covering or paint is applied. Lastly, slide your fingers along all of the structure that will be exposed to the covering and smooth out any rough spots with 320-grit paper.

Sanding finished structures isn't the only thing a sanding block can do. When used in combination with the edge of the workbench, it's a good way to sand a smooth end or edge on strip or sheet wood. The edge of the bench acts as a sanding guide to keep the face of the block at a fixed angle to the work. Often, when strips are cut with a razor knife, the cut isn't always at the exact angle necessary for a tight joint. The sanding block and bench edge can make the correction quicker and more accurately than recutting the strip with the knife.



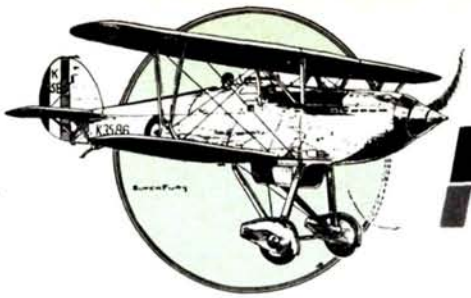
Wrapping the sanding block with paper serves a similar purpose to masking.

Die-cutting usually leaves the edges of parts slightly crushed or splintered, so all die-cut parts should be sanded before construction starts. A sanding block with 150-grit paper is just the right tool to form the crisp edges on parts that make for solid joints. Strips of sandpaper glued to one surface of spar stock can be used to sand the notches in ribs and formers.

All sanding should be done in a well-ventilated area. A box fan can be used as an exhaust fan by attaching an air conditioner filter to the back of it and doing your sanding in the filter side. This system will control the dust quite well if the filter is changed or cleaned when full. Balsa dust is very light and it will cover everything in the shop if it's allowed its freedom.

Sanding sealers and fillers are important adjuncts to sandpaper, but for the most part sport-type airplanes can be built without them and look beautiful—but not without sandpaper.

Randy Randolph, c/o *Model Airplane News,* 632 Danbury Rd., Wilton, CT 06897. ■



Fifty Years Ago...

by DAN SANTICH

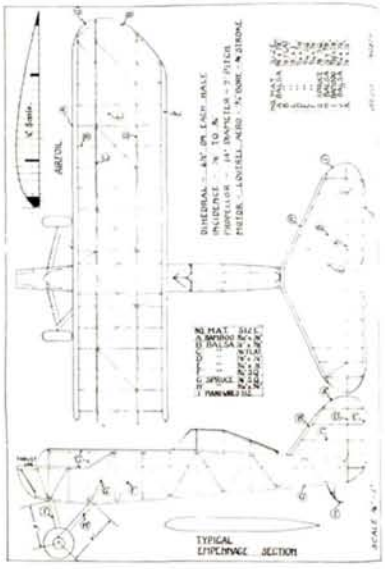
JULY 1936 WAS A "busting out" period for gasoline engine-powered models. New kits, engines, and accessories were being introduced almost daily to feed the enthusiasm of the young, aviation-minded individual. Almost overnight the gas engine captured the interest and imagination of thousands of youths with an eye toward the sky.

The sheer joy of seeing your own creation take to the air, soar aloft with the engine pulling it proudly, and then, when the fuel ran out, gently glide back to a safe landing were the things most modelers in 1936 only dreamed of.

Sometimes, if everything was perfect, a model would catch a thermal and stay aloft for hours. Many were lost when they rode a thermal, carried by a wind that was faster than the modeler could run! Running through bushes, neighbors' yards, and fields of clover, with barking dogs in hot pursuit was what modeling was all about. And if you got your model back, you would boast to your friends about how beautifully she flew, explaining every detail of that monumental and exhilarating experience. Usually that was all it took to get hooked—one good flight. Even seeing such a sight was enough fuel for the imagination to keep you interested for years—or even a lifetime. It was inspiration, imagination, creativity, and reality all rolled up into one thing—modeling.

Full-scale aviation was going through a similar experience. The general public was becoming more and more aware of the advantages of air travel by commercial airlines. Private aircraft firms were producing four-place personal airplanes, such as the Stinson Reliant and Howard DGA. Flying in your own airplane was *the* status symbol of the time.

Home-built airplanes were also becoming popular, with plans being offered by several firms such as the Corben Sportplane Company and Harlequin. Aviation firms, like Sikorsky, North American, Curtiss-Wright, Boeing, and Consolidated, were all expanding their facilities for increased production capabilities.



One of the first plans to be published for the new gas-powered models was Julius Unrath's Sportster.

Now a classic, Scientific introduced their very popular Miss America gas model.

Also in July 1936, Rudolph A. Kling set a new FAI Class C Lightplane speed record of 228 mph in his Keith Ryder Special, equipped with a 272-hp Menasco engine. Howard Hughes still held the international Class C speed record of 353 mph set in September 1935.

Over 400 contestants gathered in Detroit, Michigan, for the 1936 Nationals under sanction by the National Aeronautic Association and sponsorship by the *Detroit Times*. The results of this contest were reported in the September 1936 issue of *M.A.N.* New personalities, products, and technology were entering the hobby and *Model Airplane News* was there to tell you about it, 50 years ago this month. ■

The Brown B-3 light Monoplane used a 250-hp Menasco C-6S engine.

The Liberty Sport is a huge model, spanning nearly 8 feet. The model is shown here with the author's son, Michael.

by ROGER STERN

LIBERTY SPORT B

A beautiful biplane with performance to match.

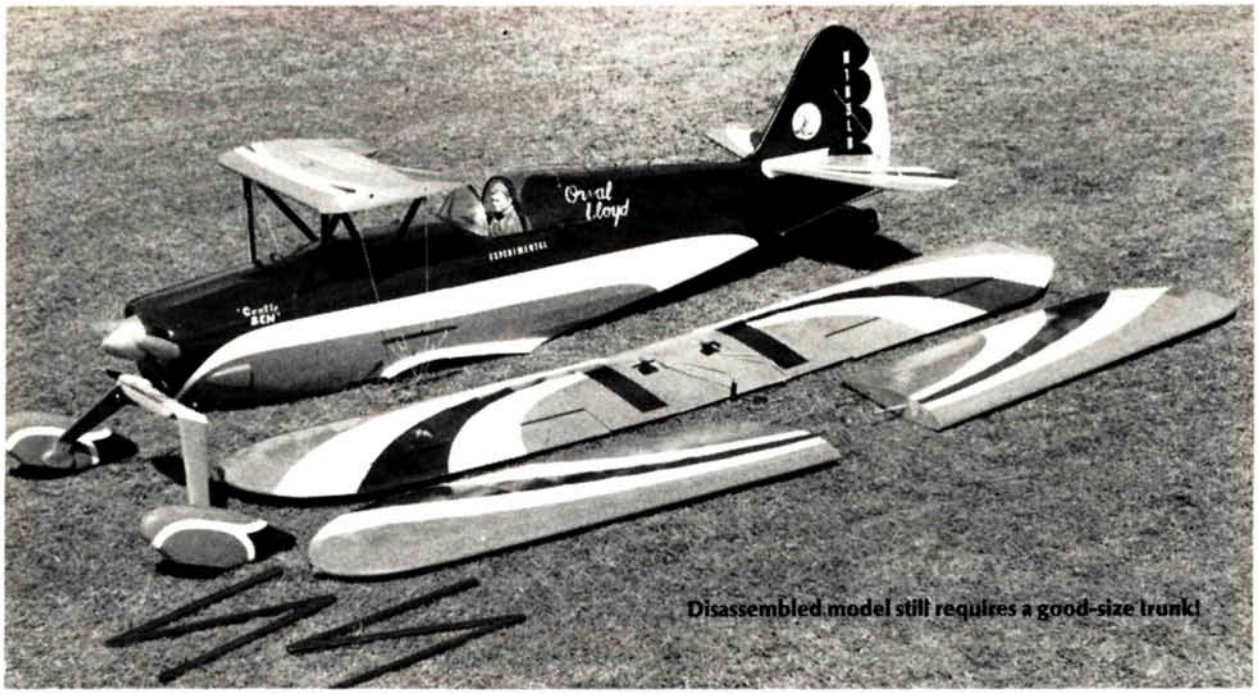
The moment of truth.

I THINK MOST modelers are familiar with the Liberty Sport biplane. This is somewhat surprising, because there has only been one original full-size prototype, built and owned by Orval Lloyd. The popularity of the model came about when Sig Manufacturing kitted the design originally made by Dick Graham. Dick's original design was also published in *M.A.N.* (plan #80, $18.00) in August 1971.

What most people don't know is that Orval Lloyd is building another full-size prototype; a modified version called Liberty Sport Model "B" and it's this version that is represented here. It's scaled at 3¼ inches to 1 foot or, in other words, "a little over ¼-scale."

First let me tell you how I came to do the B version. I had already built and flown a couple of the Sig kits and wanted to move to giant-scale. As I love biplanes, I decided to enlarge the Liberty from the scale drawings given in the Sig kit. Knowing how well the small ones flew, I knew a larger version could only fly better.

The motor I used is a Kioritz 2.4, which is fully enclosed in the cowl and turns a 20x10 Top Flite prop. The model came out at 25 pounds and flies exceptionally well even at the 5,000 feet altitude here



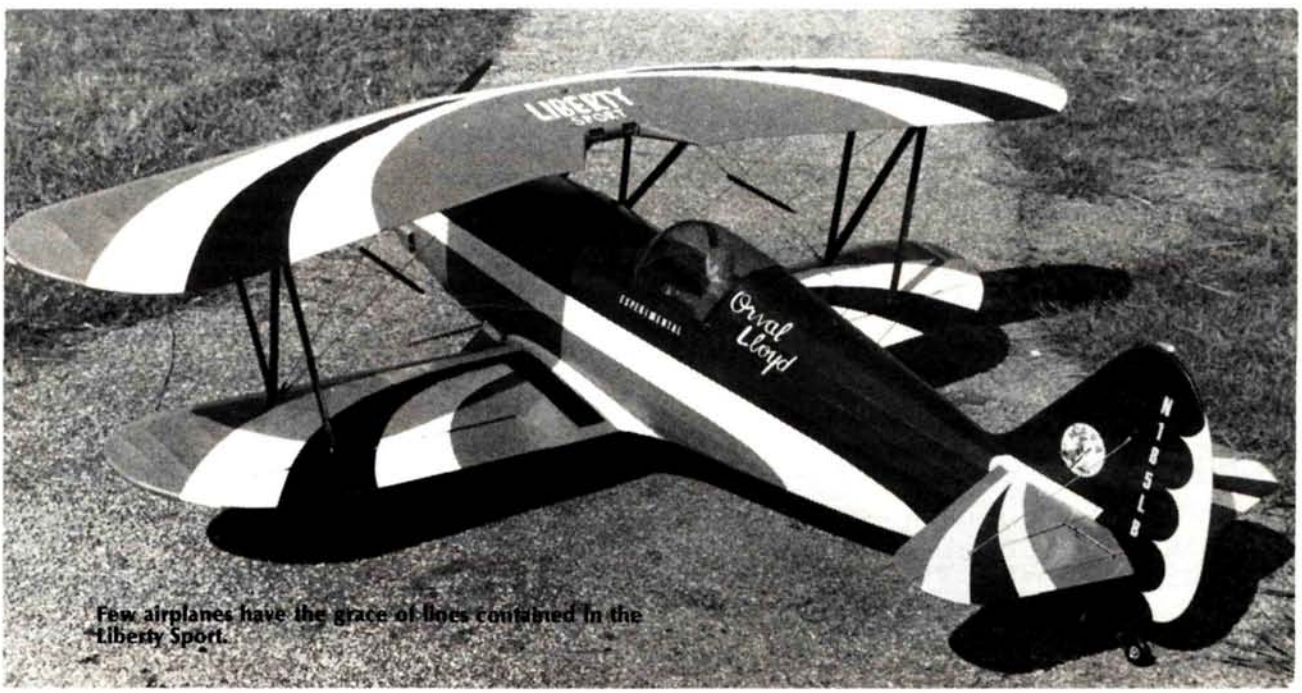
Disassembled model still requires a good-size trunk!

SPECIFICATIONS:
Type: *Giant-Scale*
Wingspan: *7 feet, 9 inches*
Wing Area: *2,041 square inches*
Weight: *25 pounds*
Scale: *3¼ inches to 1 foot*

in Zimbabwe. Takeoffs are straight and the model is airborne within 20 feet. Performance in the air is terrific. Loops, rolls, spins, and stall turns are done with ease, and landings are a dream. I can just imagine what the performance would be like closer to sea level.

CONSTRUCTION. Anyone who's familiar with large scale models or has built a biplane will have no difficulty constructing this model. Construction is basic with a few special sequences described in the notes.

Build two fuselage sides from ¼ inch square and ¼ inch sheet balsa as shown on the plans. Glue the plywood doublers on the insides of each frame. Cut the ¼ inch square cross pieces to length from the top view and make up a box with the side frames. Ensure that this is built square and straight. Fit fuselage formers F1 and F2, and don't forget to glue the 3/16-inch brass tubing between the ¼x⅛-inch strips to hold the cabane wires. Now glue on all other formers and make up and glue on the firewall. Glue on all the stringers as shown on the side view and the section drawings.



Few airplanes have the grace of lines contained in the Liberty Sport.

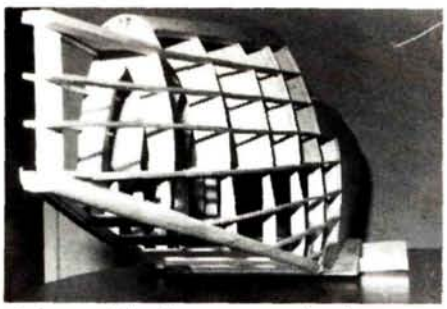
Cut the center section of F11 out for easy access to the fuel tank. Now cover the whole front end with 6-ounce fiberglass cloth and a couple of coats of polyester resin.

The 1/8-inch balsa sheeting on the front end, cockpit area, and turtledeck can now be done, but leave the sheeting off around the wing mount and tailplane area until the wings and tailplane are made and fitted to the fuselage.

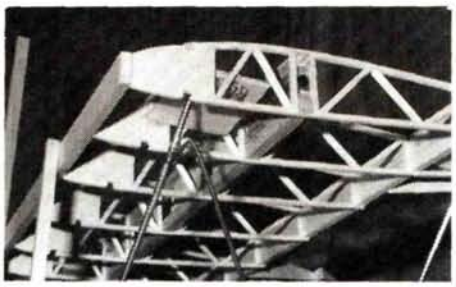
The full-size Liberty is a two-seat biplane with the front cockpit used for the passenger. In most instances, when the airplane is flown solo, the front cockpit is covered over with an aluminum plate and the windscreen removed. That is how I made the model as I think it looks much better as a single seater.

The canopy can be glued permanently in place or made to slide as I have done. To make a sliding canopy, cut the canopy and glue the windscreen part on the fuselage. I used K&S square brass tubing for the sliding mechanism. I slotted a length of 3/16-inch square tubing along its length with a Dremel cutoff wheel fitted into a drill press sitting 3/32 inch above the base plate. I then slid the tubing across the base plate, thereby cutting the slot. I fit the bottom edges of the canopy into this slot and glued it with cyanoacrylate glue. I also slotted the next size larger tubing with a wider slot and slid it over the first tubing. I glued the larger tubing to the cockpit framing and it formed the railing in which the smaller tubing slides in. It's also longer by 1½ inches and a slot is cut in F4 for it to extend rearward. Fill in with 1/8-inch sheet around the slot for the fuselage covering to adhere to. The larger tubing also has a couple of small brass tags soldered to it facing downward so that they are slotted into the fuselage

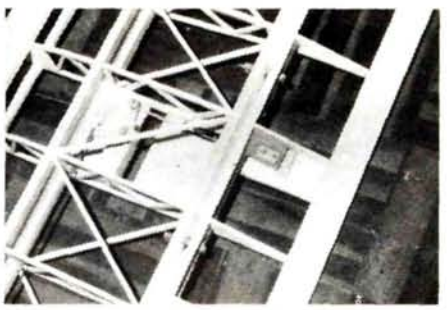
(Continued on page 108)



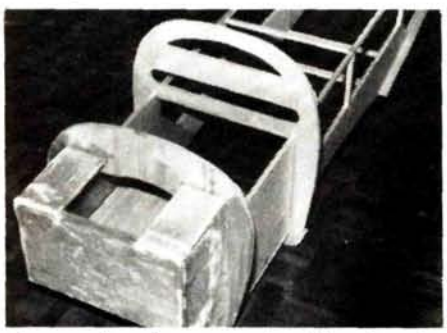
Stringered fuselage construction is strong and light.



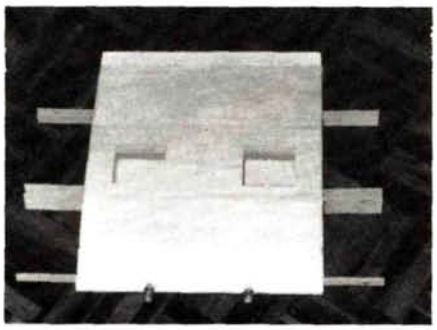
Setting up top wing for proper alignment is critical.



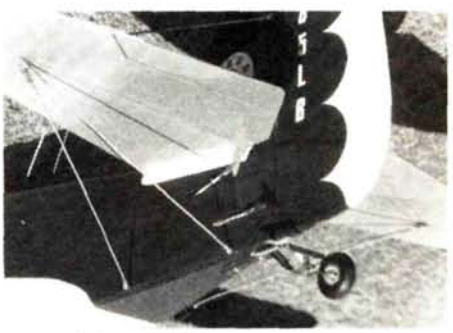
Aileron hookup is used on lower wing only.



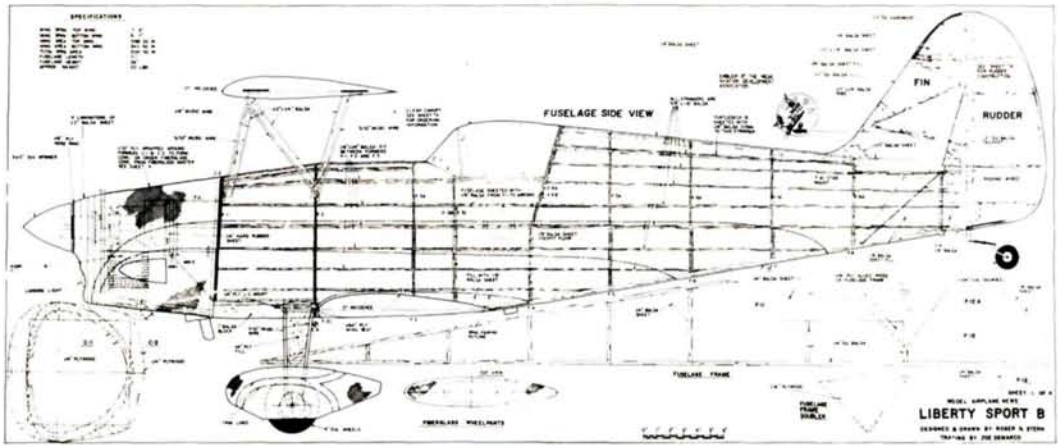
Front end engine mount should be glassed.

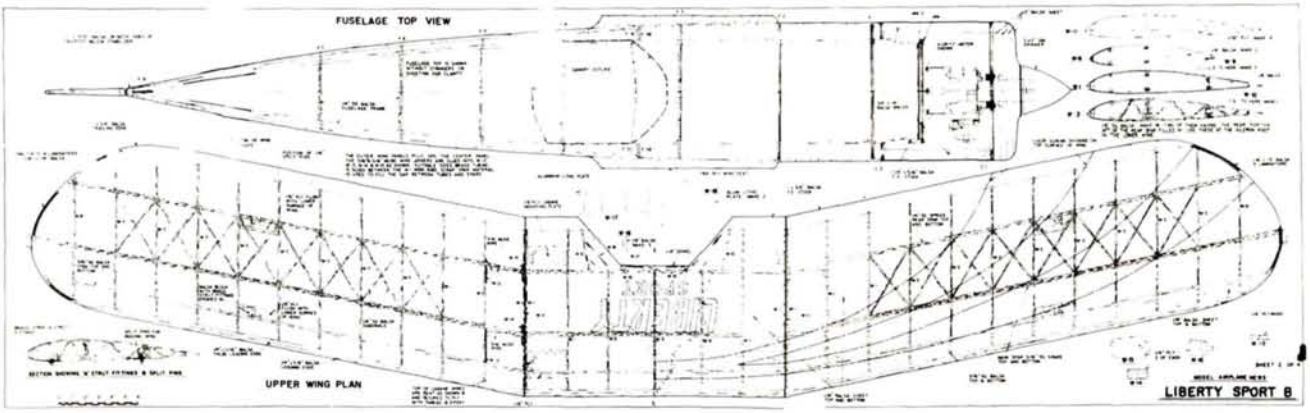


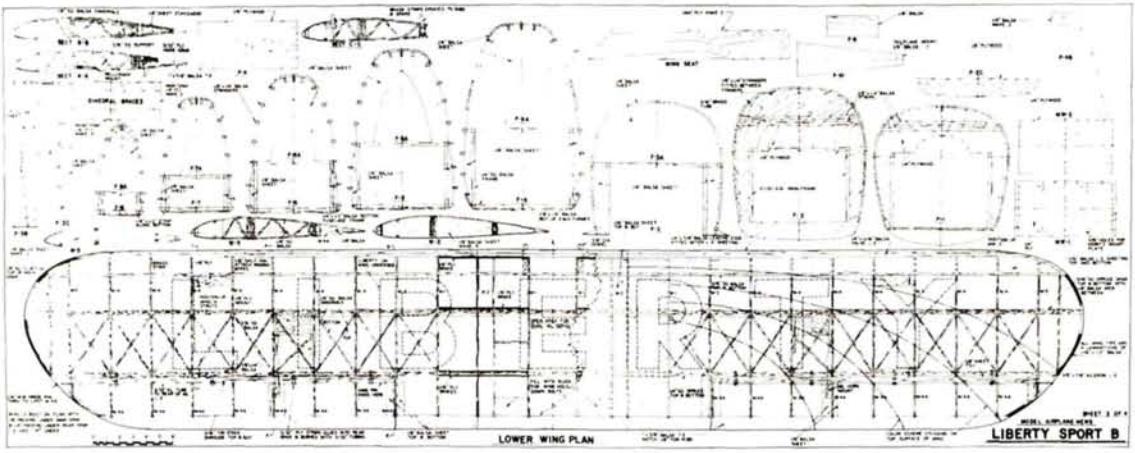
Lower wing also uses plug-in panels.

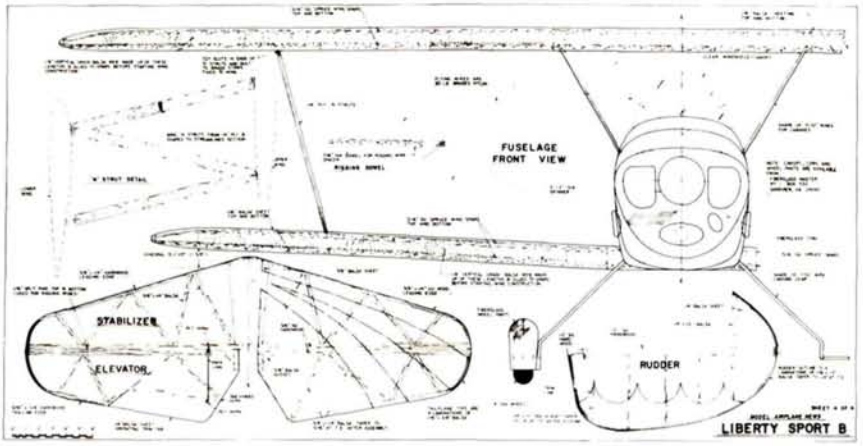


Stabilizer supports are necessary.









FULL-SIZE PLANS AVAILABLE... PAGES 120, 121

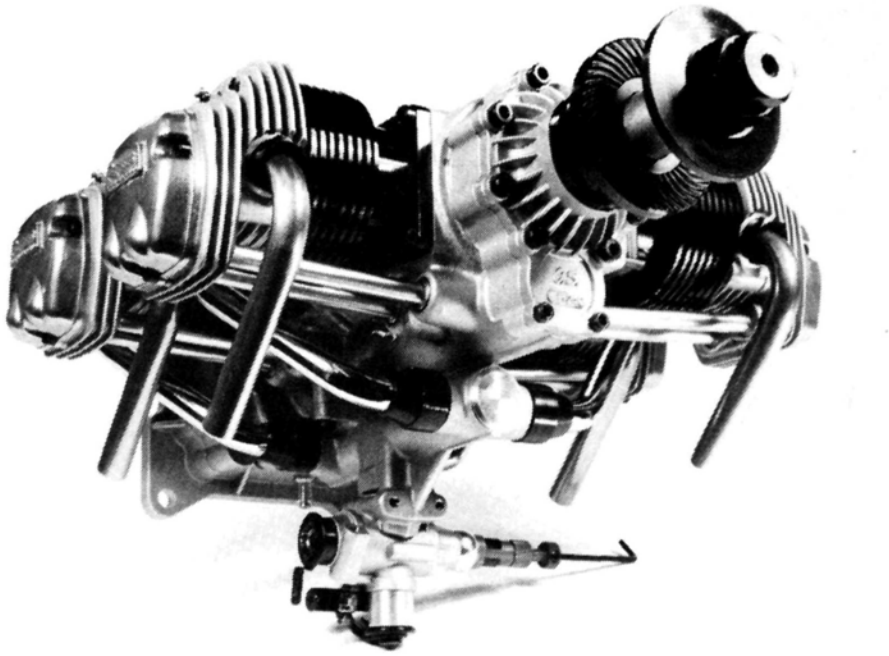
Engine Review Round-Up

by PETER CHINN

O.S. FF-240 "PEGASUS"

SPECIFICATIONS

Type: Air-cooled, horizontally-opposed, four-cylinder, four-stroke-cycle with pushrod operated overhead valves.
Bore: 24.0 mm (0.9449 in.)
Stroke: 22.0 mm (0.8661 in.)
Displacement: 39.81cc (2.429 cu in.)
Nominal Compression Ratio: 8.5:1
Speed Control: Single O.S. adjustable automatic mixture control carburetor.
Checked Weight: 2.19 kg (4.83 lb) including firewall mounting plate and choke-valve assembly.
Mounting Dimensions:
Overall width: 194 mm
Length from prop driver face including firewall mount: 181.5 mm
Bolt hole spacing (firewall mounting plate): 80x68 mm
Manufacturer's Claimed Power Output: Not stated
Manufacturer: O.S. Engine Mfg. Co., Ltd., Higashisumiyoshi-ku, Osaka 546, Japan.
U.S. Distributor: Great Planes Model Distributors Company, P.O. Box 4021, 1608 Interstate Dr., Champaign, IL 61820.

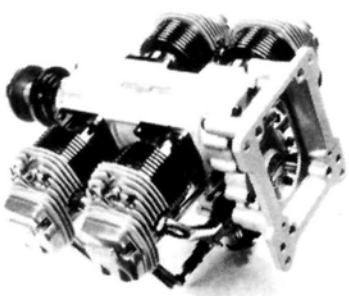


Four-strokes are beginning to look more and more realistic. Who would have guessed a few years ago that we would have engines like this?

THE ESTABLISHMENT of the model engine industry; that is to say, the volume production of model gas engines, as opposed to the building of small numbers of hand-made engines, mostly by individuals, can be said to have begun fifty-two years ago when young Bill Brown and his father formed the Junior Motors Corporation. Bill's famous Brown Junior, made in Philadelphia, set a standard for others, all over the world, to follow; one of whom was Shigeo Ogawa in far-away Japan, who built his first O.S. engine at the age of 16 and who, this year celebrates fifty years of model engine manufacture.

What, you might be saying at this point, is the connection between the Brown Junior of 1934 and our present subject, the O.S. Pegasus four-cylinder four-stroke? The answer is simple: not a lot, except as an illustration of how far we have come in fifty years—not least in how much more complex a modern four-stroke can be, compared with those early two-strokes. Including minor items, such as gaskets, screws and its simple spark timer assembly, the Brown Model B had a couple of dozen parts. The O.S.

(Continued on page 91)



Pegasus uses FT-120 Series II pistons and cylinders but with revised heads. Crankshaft is supported in five bearings.

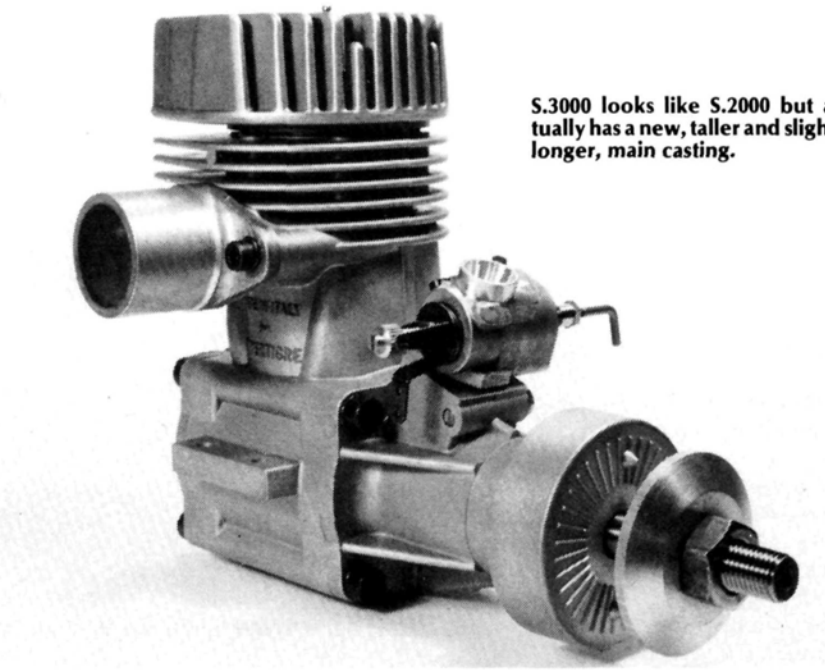
Underside view of Pegasus showing how single carburetor feeds four cylinders through long intake manifold.

Pegasus flat-four uses same firewall mount as FT-160. Good strong fuselage front end is obviously necessary.

SUPER-TIGRE S.3000

SPECIFICATIONS

Type: Air-cooled, single-cylinder, side-exhaust two-stroke-cycle with crankshaft rotary-valve and ST-Schnuerle scavenging.
Bore: 35.0 mm (1.378 in.)
Stroke: 31.0 mm (1.220 in.)
Displacement: 29.83cc (1.820 cu in.)
Nominal Compression Ratio (full stroke): 11.5:1
Speed Control: Super-Tigre Mag-V carburetor
Checked Weights: 1,174 grams (41.4 oz) bare; 1,326 grams (46.8 oz) with muffler; 1,451 grams (51.2 oz) with muffler and firewall mount.
Mounting Dimensions:
Crankcase width: 54 mm
Length from prop driver face: 143 mm
Length from prop driver face, plus firewall mount: 157 mm
Height above CL (less glowplug): 109 mm
Bolt hole spacing (beam mounts): 64x23 mm
Firewall mount bolt circle: 50 mm radius
Manufacturer's Claimed Power Output: 3.0 PS (2.96 bhp) at 7,900 rpm.
Manufacturer: Super-Tigre s.r.l., 40065 Pianoro, Bologna, Italy.
U.S. Distributor: Great Planes Model Distributors Company, P.O. Box 4021, 1608 Interstate Dr., Champaign, IL 61820.



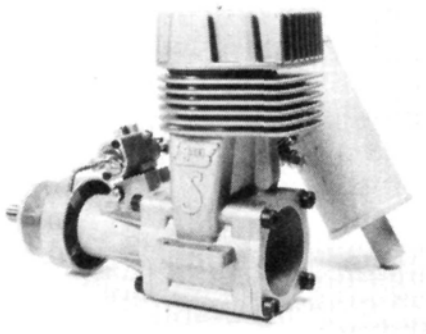
S.3000 looks like S.2000 but actually has a new, taller and slightly longer, main casting.

AT FIRST sight, the Super-Tigre S.3000 appears to be just another stretch of the basic S.2000—like the S.2000/25 (dealt with in our test series in the May issue), which is essentially a bored and stroked S.2000, contained within the same castings.

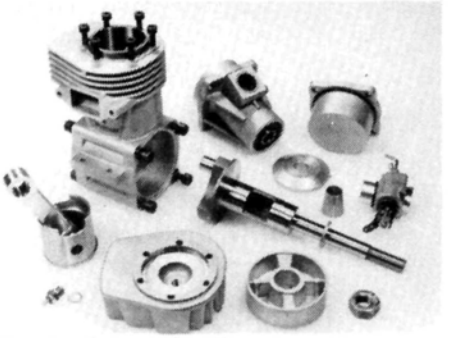
In fact, the S.3000 has a new body casting with a taller cylinder block and a slightly longer crankcase barrel. Anyone wishing to replace an S.2000 or S.2000/25, in an existing aircraft, with the more powerful S.3000, should note that the S.3000 will need an extra 5 mm (0.2 in.) cowl clearance above the cylinder head. Also, if the standard firewall mount is used, the prop driver face will be brought forward 2 mm, compared with the S.2000 and S.2000/25, which will possibly require some front end modification if a spinner is used.

Despite its bigger displacement and slightly larger external dimensions, the

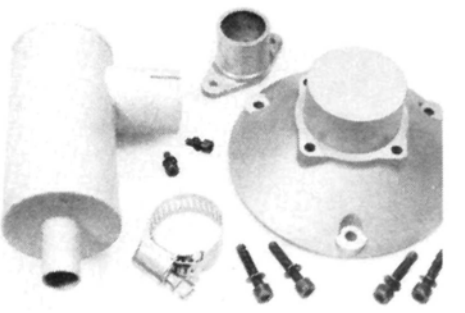
(Continued on page 97)



Muffler can be positioned horizontally, vertically, or any other convenient angle by slackening hose-clip type connector.



Despite distinctively different outside appearance, S.3000 construction follows familiar proven Super-Tigre practice.



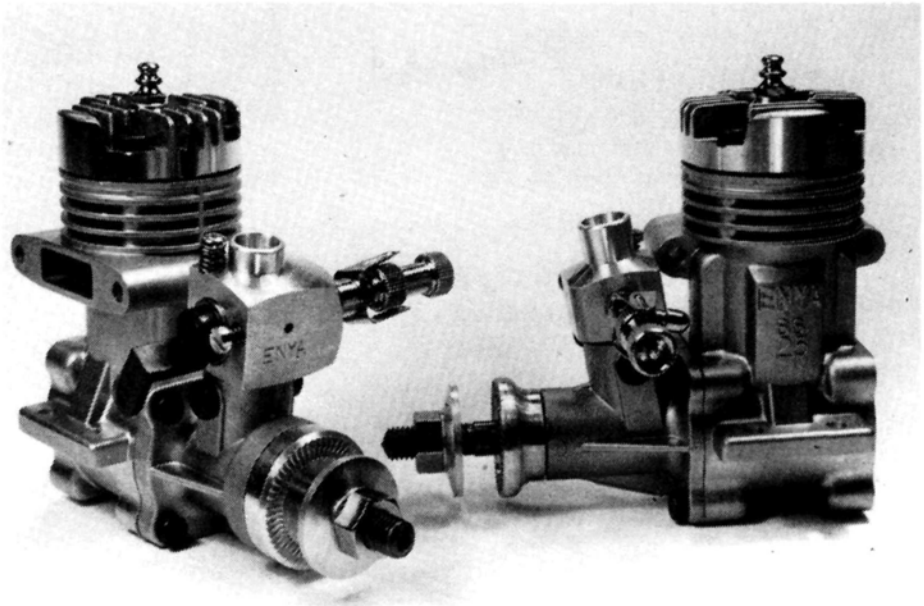
Sturdy firewall mount, interchangeable with crankcase backplate, is included. Muffler is a conventional expansion type.

Engine Review Round-Up

ENYA SUPER-SPORT 25 & 25BB

SPECIFICATIONS

Type: Air-cooled, single-cylinder, side-exhaust, two-stroke-cycle with crankshaft rotary valve and Schnuerle scavenging.
Bore: 17.8 mm (0.7008 in.)
Stroke: 16.4 mm (0.6457 in.)
Displacement: 4.081cc (0.2490 cu in.)
Nominal Compression Ratio (full stroke): 10:1
Speed Control: SS-25—Enya standard airbleed type carburetor with 5 mm choke; *SS-25BB*—Enya "G-Type" automatic mixture control carburetor with 5.5 mm choke.
Checked Weights: SS-25—217 grams (7.65 oz) bare; 260 grams (9.17 oz) with Enya M250 muffler; *SS-25BB*—237 grams (8.36 oz) bare; 284 grams (10.02 oz) with Enya M251 muffler.
Mounting Dimensions:
Crankcase width: 29.5 mm
Length from prop driver face: 73 mm (SS-25); 72 mm (SS-25BB)
Height above CL (less glowplug): 58.5 mm
Bolt-hole spacing: 37x15 mm
Manufacturer's Claimed Power Output: SS-25—0.5-0.65 PS less muffler, 0.4-0.55 PS with muffler; *SS-25BB*—0.6-0.75 PS less muffler, 0.5-0.65 PS with muffler.
Manufacturer: Enya Metal Products Co. Ltd., Nerimaku, Tokyo 176, Japan.
U.S. Distributor: Altech Marketing, P.O. Box 286, Fords, NJ 08863.



Super-Sport SS-25BB (left) and SS-25 are just two models in a new eight-model Enya two-stroke range.

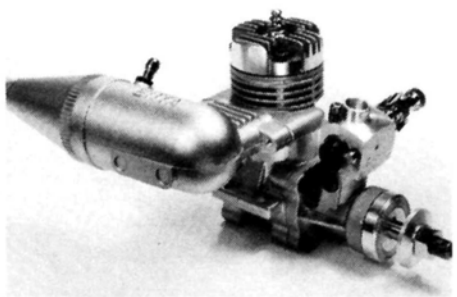
THE TWO largest Japanese model engine manufacturers, O.S. and Enya, list incredibly large ranges of engines, both two-stroke and four-stroke. Every year, their numbers seem to increase and, as of April 1986, these two manufacturers had, between them, no less than 134 models on their product lists. Among the latest additions to the Enya range are the new "Super-Sport" series of small two-stroke engines, two of which are the SS-25 and the SS-25BB described here.

Interestingly, although Enya has produced two-stroke engines in practically every popular displacement group from .049 cu in. to .60 cu in. (plus some odd in-between sizes and a .63 as well) along with four-strokes from .35 to 1.20—shortly to be joined by a 2.4 cu in. Vee-Twin—this is the first time the factory has offered a .25.

(Continued on page 98)

Super-Sport 25 standard model has bronze main bearing and airbleed type carburetor.

Externally, Super-Sport series retains a strong family likeness to previous Enya two-strokes.

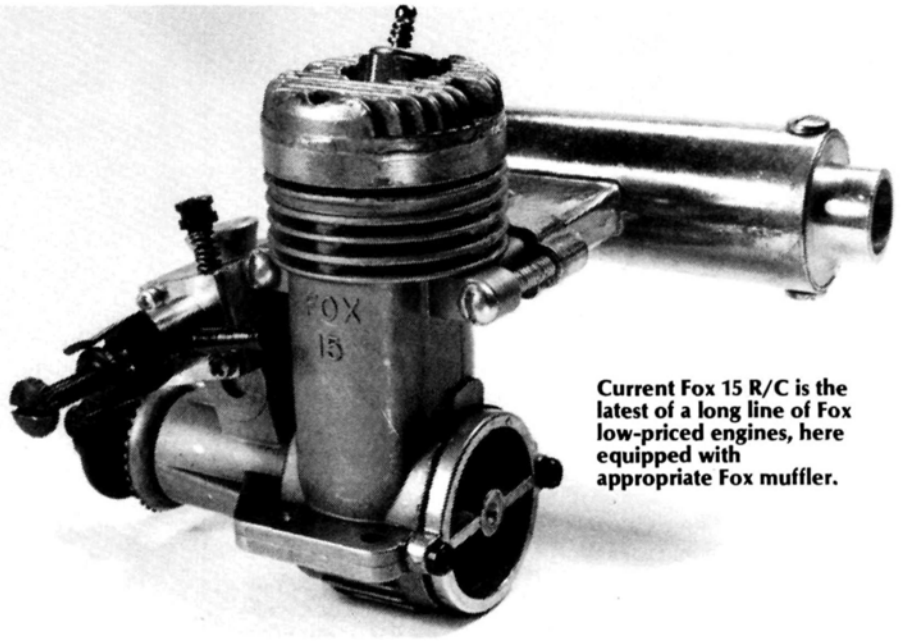


SS-25BB features twin ball-bearing shaft, G-Type carburetor, and larger M251 muffler for reduced power loss.

FOX 15 R/C

SPECIFICATIONS

Type: Air-cooled, single-cylinder, side-exhaust two-stroke-cycle, with crankshaft rotary valve and crossflow scavenging.
Bore: 0.590 in. (14.99 mm)
Stroke: 0.540 in. (13.72 mm)
Displacement: 0.1476 cu in. (2.419cc)
Nominal Compression Ratio (full stroke): 7.5:1
Speed Control: Fox 2-needle automatic mixture control carburetor.
Checked Weights: 125 grams (4.41 oz) bare, 153.5 grams (5.41 oz) with muffler.
Mounting Dimensions:
Crankcase width: 24 mm
Length from prop driver face: 55 mm
Height above CL (less glowplug): 51.2 mm
Bolt hole spacing: 31.75x12.7 mm (1¼x½ in.)
Manufacturer's Claimed Power Output: Not stated. (See text.)
Manufacturer: Fox Manufacturing Company, 5305 Towson Ave., Fort Smith, AR 72901.



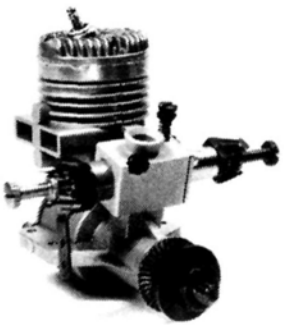
Current Fox 15 R/C is the latest of a long line of Fox low-priced engines, here equipped with appropriate Fox muffler.

THE old-established Fox company currently offers a choice of two engines in the .15 cu in. class. The more advanced of the two, the Schnuerle-scavenged 15BB, was dealt with in the December 1985 *M.A.N.*

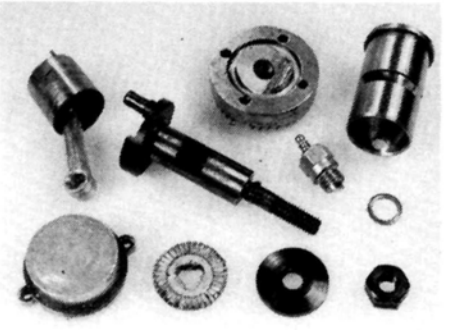
The other one, described here, is a much simpler engine, but is one that performs a vitally important function. The Fox 15 is by far the lowest-priced .15 size engine on the U.S. market and, these days, when we are quite used to seeing new engines that cost hundreds of dollars, it is as well to remember that young beginners still need low cost motors. The Fox 15 can be bought for little more than half the price of most other engines of the same displacement.

Why is it cheaper? Like many Fox engines, the 15 does not win any medals for a fancy outside appearance, but there is no lack of quality where it really matters. The fact that the Fox 15 can be so competitively priced, comes we would guess, from the fact that its major tooling costs must have been written off ages ago. Although it seems hard to believe, this engine had its origins in the Fox 15X of 1962. Faithful readers of the *M.A.N.* "Engine Review" columns who still happen to have their 1962 issues handy (!) can check this by referring to the July and December issues of that year for test reports on, respectively, the free-flight/controlline model 15X and the throttle-

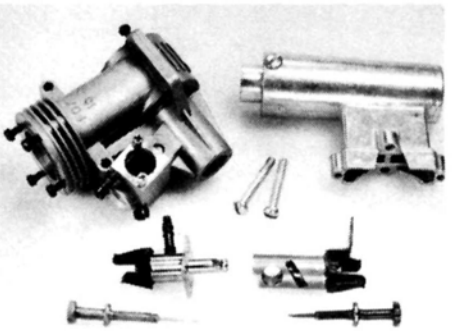
(Continued on page 106)



Latest Fox 15 R/C is fitted with new two-needle carburetor providing automatic mixture control.



Fox 15 uses traditional crossflow porting with lapped cast-iron piston running in steel cylinder sleeve.

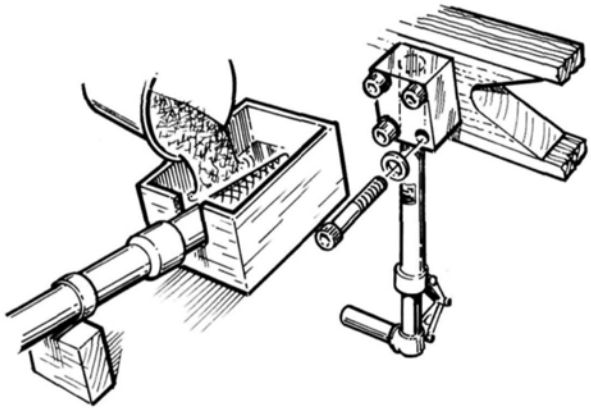


Main casting with carburetor disassembled. Muffler is an optional extra and contains a slotted outlet tube to reduce noise.

Hints & Kinks

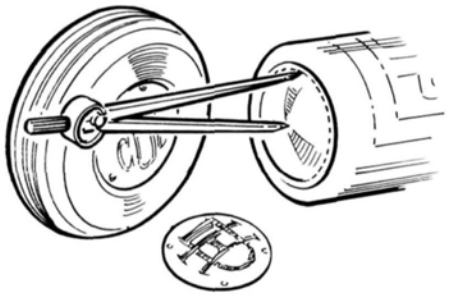
by JIM NEWMAN

Model Airplane News will give a free one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Hints & Kinks." Send rough sketch to Jim Newman, c/o **Model Airplane News**, 632 Danbury Rd., Wilton, CT 06897. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO, AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we cannot acknowledge each one, nor can we return unused material.

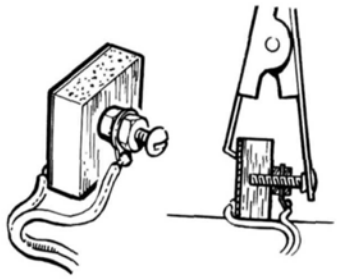


This is a real unique way to set that scale fixed landing gear at the correct angle. From another top British scale modeler: jig the gear at the correct angle then build a small box of card or balsa around the top. Seal around the leg with modeling clay, then pour in resin heavily laced with chopped glass fiber. When set, strip away the box, then drill for mounting bolts. When bolted to spar the angle is automatically set.

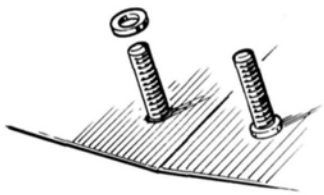
Graham Smith, Sutton Coldfield, England



Ever wonder how to make those neat, domed metal, hub covers used on some full-size airplanes? They are as close as your nearest soft-drink machine! Use a set of dividers to scribe the domed bottom of a soft drink can several times, then remove the domed disc. Add the appropriate logo, then attach to the hub with your favorite glue or small screws. *Ken Booher, Park City, Illinois*

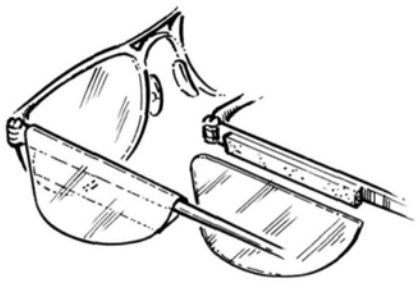


A tightly-cowled engine won't allow your spring type glo-clip to fit? Install this gadget in the cockpit or elsewhere that is convenient. A block of wood which has a bolt epoxied in one side and a piece of brass or copper (printed circuit board would be great) glued to the other. **Note:** bolt and metal sheet must **not** touch! Solder wires to the bolt and sheet metal then connect one lead to ground on the engine and one to the plug. Attach your glo-clip as shown, for starting. *Tom Ekstrand, Hudiksvall, Sweden*



Ever get to the field to find you left the wing bolts home on the bench? This modeler recommends his idea—cut rings of surgical rubber tube which are slipped over the wing bolts to retain them in the wing. The rings are then a semi-permanent fixture along with the bolts.

Senji Watanabe, Fukuoka, Japan



A problem which plagues many of us—the wind getting behind the glasses and causing watery eyes, making it difficult to see the model. Fold and glue plastic side shields to fit over the sideframes, leaving enough room in the "pocket" to slip over the curved part. An alternative is to attach shields with strips of servo tape.

Roy McGuckin, Fairport, New York

Hobby Shack

SPECIFICATIONS

Type: *Sport Scale*
Span: *55.75 inches*
Area: *532 square inches*
Engine: *.40-.60 two-cycle*
.60-.80 four-cycle
Channels: *4*

IN THE WORLD OF full-scale aerobatic airplanes there are two distinctly different categories of competitive machines. The biplane, represented by the Christen Eagle, Pitts, Weeks Special, and similar "two wingers," is well known for its short-spanned, close-coupled design features. Rapidly gaining ground, and thought by many to be superior, is the medium aspect ratio, long moment, new generation monoplane. Count the Yaks, Zlins, Sukhois, Stephens Acros, and similar machines among this new breed and *don't* forget the Laser—especially Leo Loudenslager's Laser!

This airplane, from a modeling popularity standpoint, rates right up there with the Cubs, P-51s, and CAPs. The current interest in large, scale type, Turnaround pattern airplanes no doubt contributes to the popularity of the Laser.

Bud Light LASER

An E-Z version of Leo's super stunt ship.

by RICH URAVITCH

The kit under review represents the latest in the line of the Hobby Shack* "EZ" series of nearly ready-to-fly kits. Those of you who are unfamiliar with the EZs should really acquaint yourselves with them, especially if you enjoy flying a "true" (warp-free) and well-designed machine but don't have a lot of time to build. The Laser is the third EZ I've had; the Decathlon and Pitts preceded it and something, no doubt, will succeed it.

It's hard to argue with the value of the kits! They contain everything except radio and engine. This Laser is the second one available from Hobby Shack. The previous, blue-colored version is no longer available. When a manufacturer replaces one item with a like item with what appears to be only a color change and claims it to be "new," I get somewhat skeptical—new paint on an old car does not make it a "new" car. Figuring the only way to see what was "new" was to research the "old," I looked up what Art Schroeder said in his review of the early version in the September 1983 issue of *M.A.N.* He apparently enjoyed the airplane.

So what has evolved over nearly three years? According to the published specs, the wing has lost 11 square inches and has gotten lighter but stronger, and the tail moment has been increased along with the stab area. I suppose you'd have to fly them together to appreciate any real flying quality differences. What I can tell you is that this Laser is a very aerobatic yet predictable scale-like pattern ship. I've flown the Laser and the EZ Pitts back-to-back and find lots of similarities to the reported full-scale "differences." You can maintain a smaller viewing "box" with the Pitts but it flies differently, perhaps "dartier" than the Laser. It's equally capable, just different.

by BUDD DAVISSON

Leo and his Laser

FOR NEARLY all of aeronautical history, aerobatics (akrobatics) were the cloistered domain of the biplane. If it didn't have two wings, it couldn't akro. Leo Loudenslager single-handedly changed all that. While he didn't invent any entirely new concepts and he didn't invent aerobatics, he did bring the monoplane into the sport in a very forcible manner. More than that, he changed the looping ballet of competitive aerobatics into rectilinear displays of lines and angles more befitting a karate match than a ballet.

Louden-slager is known for doing things the easy way, a trait that was evident when he showed up at his first national contest in the very early 1970s. For one thing, he had flown only one other contest in his life. Secondly, he wasn't going to climb the ladder rung by rung. He was leaping right for the top by competing in the Unlimited category against the best pilots in the nation. Lastly, his mount was an untried monoplane, something that was nearly sacrilegious in a sport that was totally dominated by Pitts Specials biplanes.

Did he win? No, it wasn't a TV ending. But he did place quite highly and he turned a lot of heads. Who was this masked man with the single-wing airplane? The airplane he first fielded was a Stephens Akro designed by Clayton Stephens, originally flown by Margaret Ritchey. Loudenslager knew exactly what he wanted out of an airplane, but as he flew the Stephens he knew this wasn't it. Close, but no gold ring. So he started modifying.

Even Leo has lost track of all the modifications he has made to the airplane. His present airplane, now known as a Laser 200, is a far cry from the old Stephens. Only the wing planform remains. And it still only has one wing.

photo by BUDD DAVISSON

Leo demands total precision in his flying, something that is obvious to any who have seen him perform.

Even non-aviation types (there are still a few of those around) who witness his frenetic displays are blown away. His style is totally his own and it is hard to tell which affected which...did the airplane give him the style or did the style demand that type of airplane? No matter. Watching him fly is like seeing the biggest pattern ship in the world being flown by the best stick in the world.

Leo is at least as demanding in his building techniques as he is in his flying. The original weight-freak, he eliminates anything that isn't needed. For instance, all extraneous casting flash and bosses were ground off the

(Continued on page 126)

Leo Loudenslager demonstrates a low inverted pass. This model not built from the Hobby Shack kit!

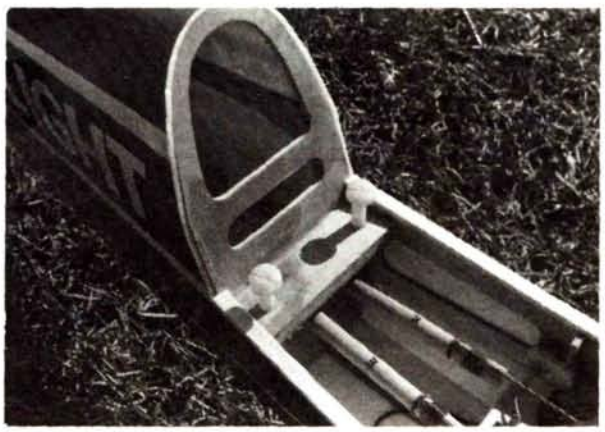
CONSTRUCTION. It will take a couple of evenings to assemble your Laser with the radio installation consuming a reasonable portion of that time. One key time saver here is, since the elevator halves are not connected by a wire U-shaped horn, but rather individually driven by a pair of wire pushrods attached to a common dowel, route these wire pushrods through the fuselage side prior to attaching the stab.

The balance of the installation is straightforward with more than adequate room for most radios. I used my Hobby Shack Cirrus, mostly because it has worked without a glitch since I bought it three years ago. Two servo mounting boards are thoughtfully provided; one locates the servos farther aft than the other to compensate for the heavier four-stroke engine installation, a nice touch. I installed an Enya* .40 CX with a stock muffler and the CG came out practically on the button. It was easily measured since the CG position is pre-marked on the outside of the fuselage side.

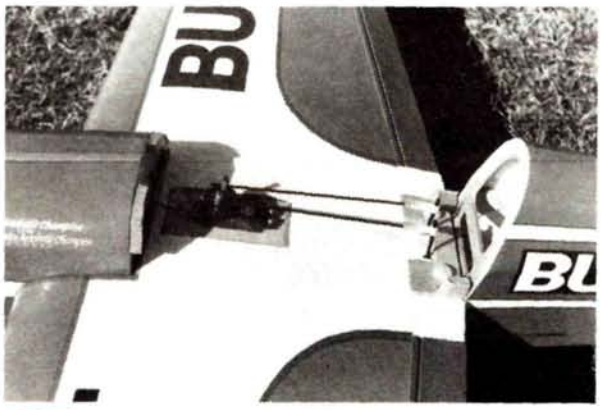
Another clever touch has been incorporated with the use of plastic, button-type cowl retainers which snap into metal firewall-mounted brackets. This means no more fuel-soaked hardwood blocks falling off from vibration and no more screws eating progressively larger holes in both the cowl and blocks.

Assuming that nothing is beyond improvement, I made two; one practical, the other preference. On the preference side, I replaced the kit-supplied steel wing hold-down bolts with nylon—really

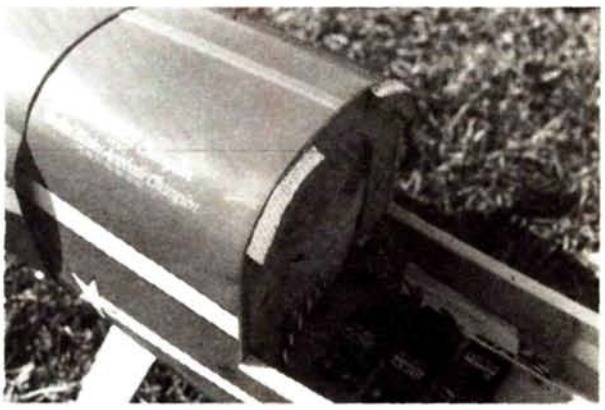
(Continued on page 107)



Nylon wing hold-down screws were substituted by the author.



Aileron servo and torque rod hookup are easily accessible under removable cockpit hatch.



Control servos are mounted forward to facilitate CG location.

Control Tower

by CHARLIE KENNEY

THIS MONTH I'M reviewing the Circus Hobbies* JR Century 7 single-stick radio system. It's named N7-4SMS and is manufactured by the Japan Remote Control Company, one of the world's leading R/C equipment manufacturers. The set comes with transmitter, receiver, four servos, charger, and many accessories.

The first thing that strikes you about the Century 7 is the size of the transmitter. It measures roughly 8.5x6.5x3.0 inches and weighs a little over 2½ pounds. Its construction employs a brushed aluminum and black anodized case, and has a logical layout of controls, a dust-proof open gimbal stick, and functionally positioned trims. The single-stick employs a large 1.375-inch diameter knob, which stands out from the case about 2.25 inches. Stick action is positive and very smooth. The control stick is not adjustable, but I didn't find that to be a problem. Because I'm a single-stick nut, I particularly enjoyed flying with this system. My particular set operated on 72.550 MHz—channel 38. Let me highlight some features:

photos by SUE KENNEY

The JR Century 7 single-stick system. Many excellent features.

Transmitter-N127F

- Heavy-duty aluminum case
- Plug-in RF module
- FM modulation
- Dust-proof open gimbal
- Ratcheted electrical "double trims" (see text)
- Dual purpose power and voltage meter
- Redundant pilot lights
- Removable collapsible antenna
- Carrying handle/backrest
- Rudder/aileron mixer
- Flap/elevator mixer
- V-tail mixer
- Dual-rate and exponential controls for aileron, rudder, and elevator
- Servo end-point adjustment for rudder, aileron, elevator, retracts, and low-end throttle
- Servo reversing (all 7 channels)
- Direct servo controller (DSC)
- Trainer system (cable not included)
- Rechargeable batteries (700-mAh)

Receiver-NER 337

- Mini FM receiver with custom-made IC
- High selectivity (8 KHz/50 dB)
- Size: 1.43x2.44x.82 inches
- Plug-in crystal
- Weight: 1.58 ounces

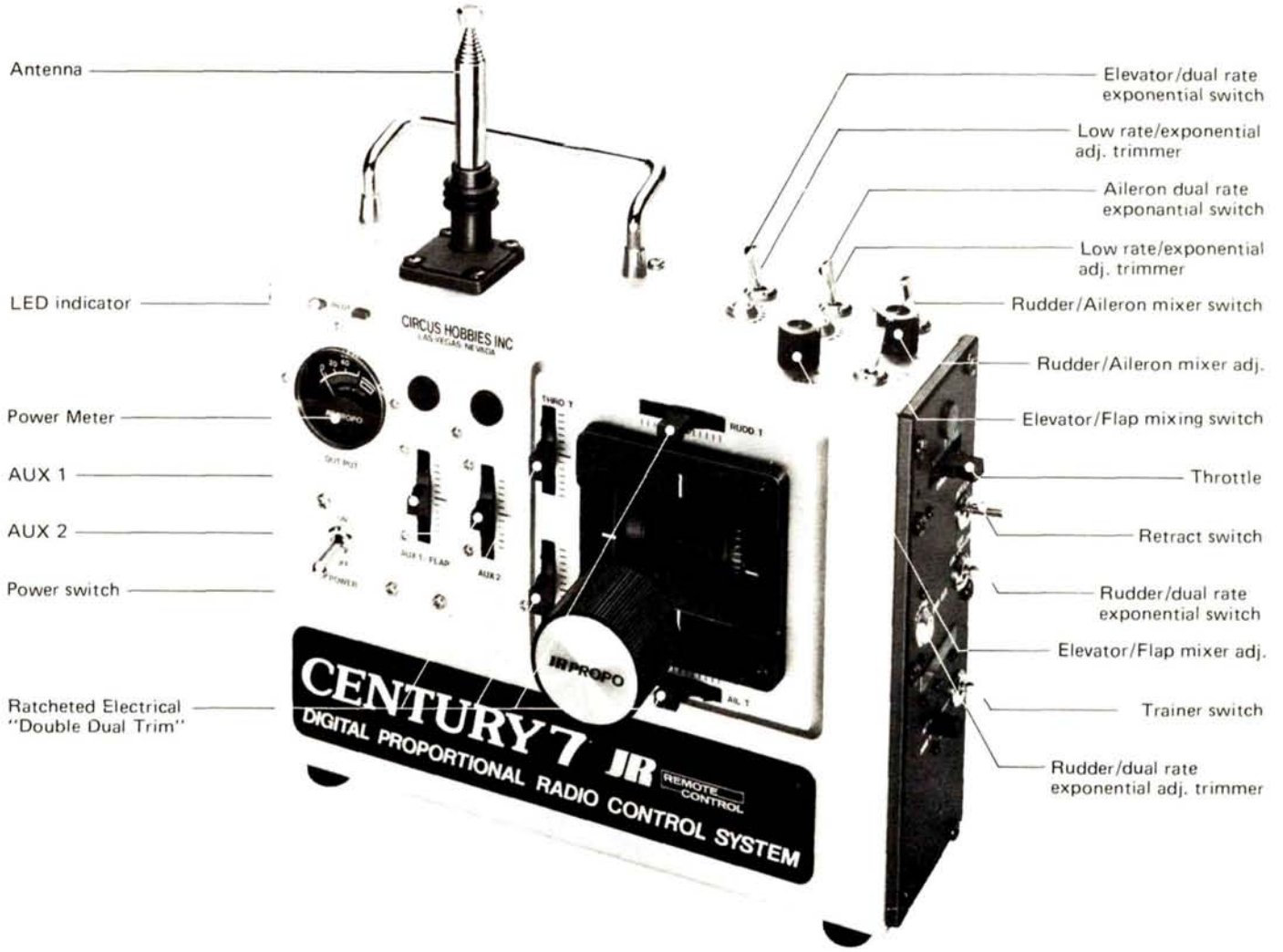
Servos-JRS501

- Motor: 16-mm ferrite motor
- Torque: 42.75 oz-in.
- Speed: 0.5 sec/90°
- Input pulse: 1.5 ms plus/minus 600 ms
- Size: 1.52x1.36x.76 inches
- Weight: 1.4 ounces
- Servo cases are made of glass-filled nylon for extra strength and durability
- Custom-made IC results in excellent resolution and centering
- Splined driveshaft for ease of installation and set up

Charger-JRC221

- Input: 110V AC 50/60 MHz
- Output: 50 mAh (transmitter and receiver) into corresponding batteries

The complete system as it arrives.



Airborne Battery-JRB500

- Voltage: 4.8V DC
- Capacity: 500 mAh
- Size: 1.95x1.15x1.15 inches
- Weight: 3.9 ounces

Switch Harness-JRA001

- Switch: DPDT ball lock type
- Connectors: Tri contact type
- Incorporates provisions for external charging

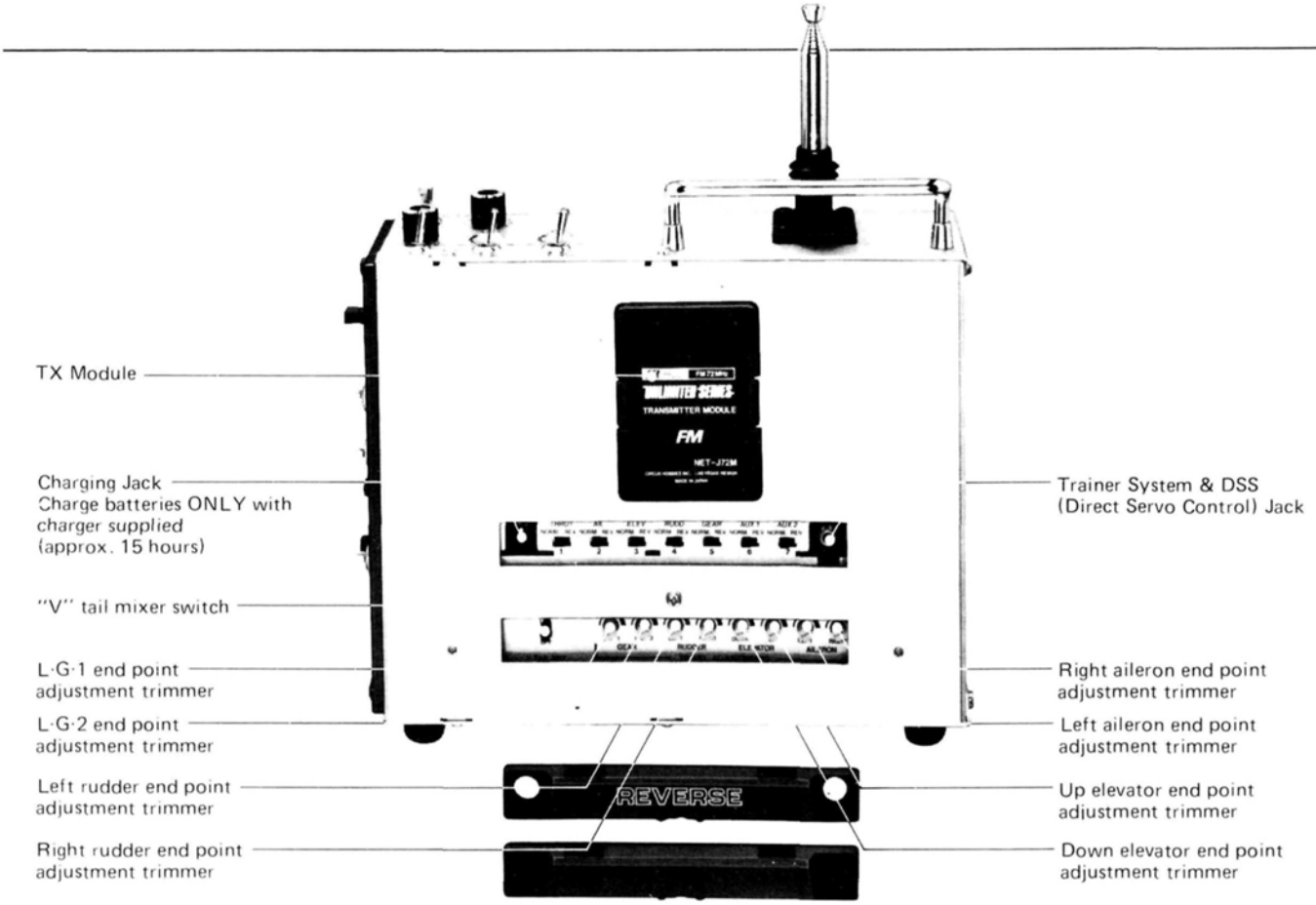
Accessories Include:

- Servo output fittings set
- Frequency flag
- DSC cord (direct servo control)
- One standard servo extension cord (12 inches)

My first impression of the Century 7 transmitter was that it had a lot of controls—21 exterior controls and another 16 under the back slide covers. But it's really not as complicated as it appears.

I'll start with the transmitter front panel. At the upper left are two red LEDs (light emitting diodes). They are the power On indicators and are redundant. Below the LEDs is the power/battery meter—when it's in the red, it's time to recharge. Below the meter is the On/Off toggle switch. You must pull the switch out and up to turn the transmitter on. Moving to the right, we find two trim controls labeled "Aux 1/Flap" and "Aux 2." Actually, you can use the auxiliary channels for anything you want.

Next to the auxiliary controls is the closed gimbal stick, where you have aileron, elevator, and rudder control. Elevator and aileron are conventional. Rudder is controlled by the stick knob. Clockwise movement is right, counterclockwise left. Also, the stick trims are located on the front panel, rudder trim above the stick, aileron below—they move right and left as you would expect.



On the left side of the stick you'll find elevator trim below and throttle trim above. They move up and down. Please note, however, that the throttle control is located on the right side of the transmitter.

To my taste, the transmitter front panel is an excellent layout—it's uncluttered. Before I leave the front, I'd like to point out a fine feature of the trim controls. Circus Hobbies calls it "Double Dual Trim." After adjusting the trim lever for proper flight performance, the trim lever can be neutralized by lifting the top of the lever and setting to the center position. This will then allow trim movement around your flight neutral.

Moving to the top left of the transmitter, there's a carrying handle and a 46-inch, 10-element telescoping antenna. To the right, there's the elevator/dual rate exponential switch and in front of it the elevator low rate exponential trimmer control screwdriver adjustment. Next to the elevator/dual rate controls is the same control for the aileron. The rudder/dual rate control is on the right side of the transmitter.

Let me explain how they work. Each control has a three-position toggle switch. With the switch in its linear position, marked as "LIN," this control is in high rate. With the switch in the middle exponential position, marked "EXP," the control is in the exponential mode. With the switch in its third position, marked as "LOW," the control is in low rate.

The low rate and exponential adjustment is variable from 100% to 40% of normal throw and its adjustment is made by means of a trimmer pot on the transmitter and located adjacent to the

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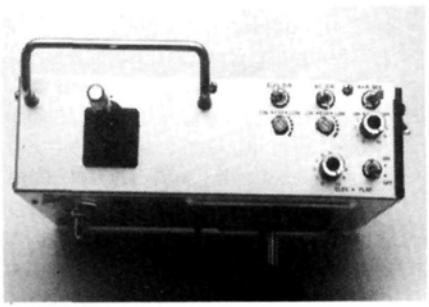
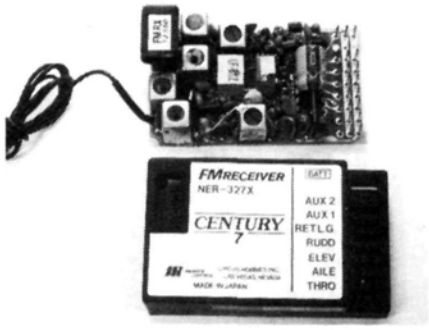


Transmitter top contains dual-rate and mixing controls.

Transmitter right side has throttle, rudder rate controls, and trainer system controls.



The 7-channel FM receiver is very compact.

Tech Tips!

Some things you may or may not hav

Basic Fuel Systems

by DAN SANTICH

UNLESS YOUR airplane is powered by a rubber band, an electric motor, or will power, you should be very interested in what I'm about to say. The biggest problem with models powered by engines is the fuel system. While our engine technology has reached a very high level of performance and reliability, the fuel system that supplies the go-juice is still in the Dark Ages.

If you look at the evolution of fuel tank design you'll see what I mean. The most primitive fuel tanks for model engines had a metal tube that was fixed to the lowest point of the tank. When aerobatics were encountered, the fuel flow was interrupted and the engine would quit. Of course, most users of early gas engines only dreamt of aerobatics.

To overcome this, Hal deBolt came up with the "Positive Flow" fuel tank, which was a metal tank with a swivel pickup that would rotate 360° inside the rear of the tank. That was fine, so long as the nose of the ship was level or pointed up. Who came up with the first flexible pickup inside a fuel tank is unclear, but there is evidence that it was used in early free-flight designs during the 1930s. If a patent had been obtained, the person would be quite rich! Obviously it was not, since virtually all R/C tanks use this method now.

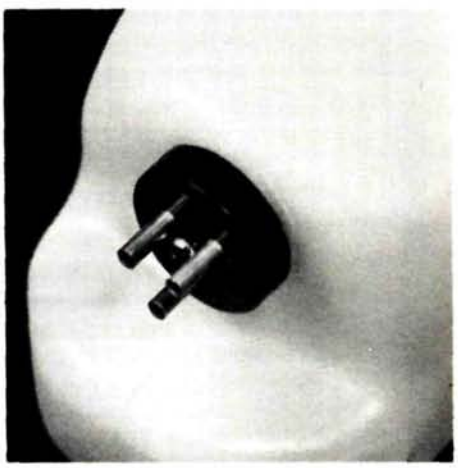
Is it perfect for R/C? Only to a degree. The theory behind the flexible pickup tank is this: a weighted piece of material is suspended at the end of a short (2- to 6-inch) length of flexible tubing inside the tank and is attached to the stationary pickup at the neck that eventually goes to the engine. The position of the pickup inside the tank is determined by gravity or centrifugal force, whichever is greater, during the course of the flight. Since the fuel inside the tank is also affected by these forces, the pickup is generally immersed in the remaining fuel throughout the flight.

This system has been around for over 20 years. Who came up with the idea of using a plastic bottle with a flexible pickup is unknown; however, so far as I can determine, Veco was among the first to make one commercially available in

Fuel tanks come in all shapes and sizes and will last indefinitely if proper techniques are followed.

Pencil points to seam that can split if care is not exercised. See text.

The Kraft tank eliminated splitting problem with steel ring on pickup.



The Du-Bro tank line incorporates some good features such as recessed connections.

known about your airplane's vitals.

1963.

Ken Willard had used a pair of plastic tanks to feed his record R/C flight to the island of Catalina in 1957. Fred Dunn's Astro Hog design became famous in the hands of Bob Dunham and won everything in sight in 1958 and 1959 until Ed Kazmirski and his Orion took the World Championships in 1960, all using plastic "clunk tanks."

The original term "clank" came about because of the deBolt fuel tank, which was metal. The weight at the end of a flexible pickup would hit the side of the brass tank and make a "clanking" sound, hence the name. When plastic bottles were found to be more desirable due to their low cost and non-leaking tendencies, the term "clunk" came about because of the different sound of metal on plastic. So much for history.

Since 1963, many different sizes, styles, and makes of plastic R/C fuel tanks have come and gone, but their basic theory has remained the same.

With the plastic fuel tank in mind, let's look at what we have. For sheer simplicity, the "modern" R/C fuel tank is hard to beat. With only one moving part, the clunk, you would think that problems would be negligible. Not so. The fuel tank used today, if properly applied and set up, will work indefinitely with little or no maintenance. If it isn't, however, it can give you fits to no end.

Like I said before, most, if not all, of our fuel tanks today are plastic. This is great because they are lightweight, inexpensive, and generally available for any size model we choose to build.

I would guess that there are presently ten different brands of fuel tanks available. Their design, quality, and adaptability can fit just about any requirement we have. Some tanks are custom-made just for modelers, while others are plastic containers used in other commercial aspects but that have found their way into our hobby. Whatever the origin, a few hints here will help you avert problems or even a disaster.

Very few tanks today are "blow molded." This is a very expensive manufacturing process where the entire tank is formed at the same time without seams. One of the best tanks on the market is the Kraft tank. It's designed with a number of features that solve most of our problems. For one thing, the vent and fill nipples, as well as the pickup line, are recessed behind the chin of the tank. This ensures that the lines do not get kinked when the tank is up against the firewall.

The fitting for the fuel pickup is protected with a metal collar to prevent splitting at the neck. It's also a very rigid tank and will not collapse and expand as much as a thin-walled tank under pressure conditions. This is a very serious consideration with engines that have engine-driven pressure pumps. If the tank isn't rigid, it can actually blow apart. Even at that, if the tank is expanding and contracting like a pair of lungs, you easily imagine what this is doing to the fuel pressure at the carb.

Disassembled Perry pump reveals a high degree of manufacturing expertise.

The new Sullivan tank collar should help splitting problem.

Various pickups and fittings to suit different needs. See text.

There are three different ways to get the fuel from the tank to the engine, however, the common denominator in all of them is the pickup in the tank. From there, the route through the tubing and to your carburetor is often plagued with difficulty.

The size of the fuel line is critical. If it's too small, the engine will have to work harder to get fuel, and will often run lean and quit when the fuel level gets low or the nose is pointed up. If the fuel line is too large, the suction in the line can be temporarily lost during throttle changes or high-G maneuvers, causing the engine to either sputter or quit completely.

The answer to this problem was found many years ago with the bladder tank or pressure tank. Jim Walker had a tank that was under pressure at all times by using a rubber bladder that was squeezed between two wooden plates by rubber bands. A pressure regulator was used to control the flow.

Another type of bladder tank was nothing more than an ink pen bladder. Some modelers used rubber pacifiers for fuel tanks. All of these methods are used to get the most fuel possible—yet only what was necessary—to the engine. In order to achieve an equal pressure at the carburetor, regulators were sometimes installed between the tank and the engine.

But back to the basic question: how do you get the fuel from the tank to the engine? Like I said, there are three methods. One is suction from the engine, one is pressure from the tank, and one is from a pump. When you get into pumps, you have several different applications as well. Some pumps pressurize the fuel tank, some the fuel line, and some the carburetor itself.

The YS engines have an integral pump

(Continued on page 39)

(Continued from page 37)

that pressurizes the fuel tank. The Perry* Oscillating pump is an in-line pump that operates from the vibration of the engine. The Robart* pump works by pressure changes in the engine and is placed in-line between engine and fuel tank, and there are several others that work on this variation.

Perry has a new pump that seems to solve a lot of problems. It's an engine pressure regulated pump that has a pickup pressure of 25 psi and a regulated output of 5 psi to the carb. With this pump the tank need not be pressurized and can be located up to 12 inches from the engine, and perhaps more. In theory, this means you can set your needle on the ground and it will remain the same throughout the flight.

When you get into the subject of pumps you're looking at a fairly recent technology, at least for model engines. I'm sure they have been around for a long time in other uses; however, as our sophistication with models grows, so does our need for devices that will fill our expectations. This is called "applied marketing," and Perry seems to be on top of it with his new pump.

Pumps are all designed to do one thing—get the fuel to the engine in a more efficient manner. Toward that end there are also pressure taps. Some modelers use crankcase pressure to give them a source of pressure to their fuel tank. In this case the tank must be sealed. Muffler pressure is probably the most widely used, since most engines that are equipped with a muffler have the pressure fitting installed or provided.

But back to our discussion about tanks. For the most part, the commercial brands available are very good. There are a few precautions in order, however. First, the split-molded tanks (ones that are made in two halves and then joined) have a tendency to split apart at the neck if the screw that secures the stopper is tightened too much. Actually, the screw only needs to be snugged down, since the rubber stopper seals the tank. I don't know how many fuselages I've seen that were soaked with fuel because the modeler cranked the screw down too much, splitting the tank neck.

Sullivan* and Robart now offer a partial solution to this problem. A molded collar is installed in front of the stopper and provides support to the tank neck. Still, you don't need to tighten the retaining screw like you were putting on a prop nut! Remember, snug is best. Of course, if you're using a YS engine with the engine pump you can forget about "snug," otherwise the pressure will blow the front right out. Most pattern fliers I know who run the YS engine wrap their tanks with stranded tape or build a box around it and seal off the front portion with silicon cement.

Another problem is with the pickup inside the tank. A pin hole in the tubing can give you fits, as can a clogged pickup filter. Ever have a plane that would only get half a flight before running out of fuel? Chances are the pickup line slipped off the brass tube inside the tank. When the fuel level gets down to half a tank, el quitto. Have you ever pressure-checked

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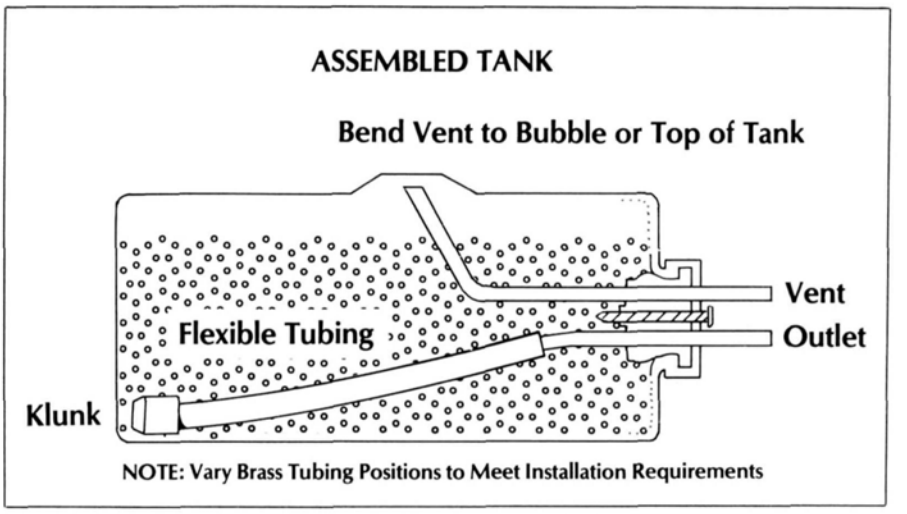
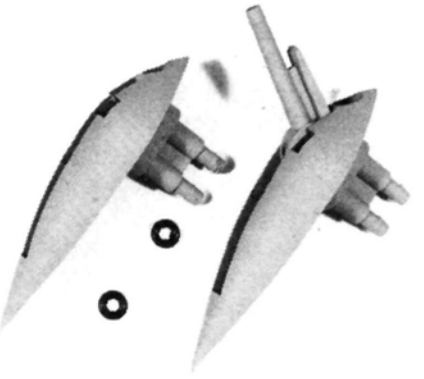
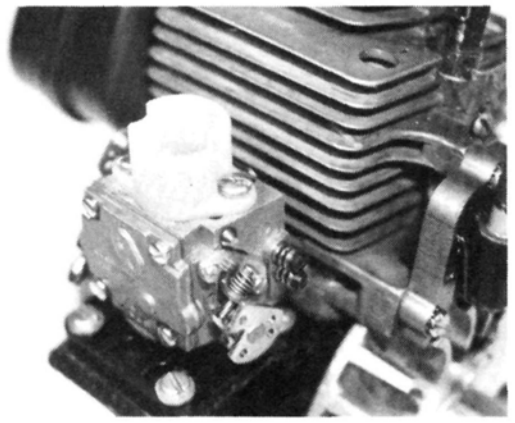
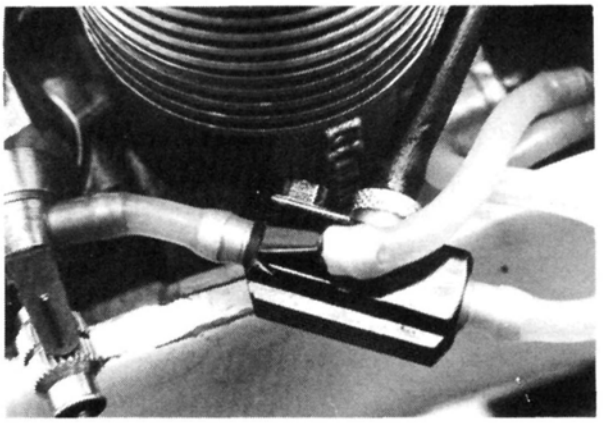




Robart's accessories include filler valves and many other fuel system goodies.



Most gasoline engines use pump styled carburetors for even fuel flow.



Robart's in-line pump operates off of crankcase pressure.

Pot O'Gold Show

by TONY DEROSA

Left: Owen Wysong was first in Sport Aircraft. Middle: Best of show went to Dave Szromba. Right: The swap shop was a beehive of activity.

MOST SWAP SHOPS and trade shows are similar in format, generally catering to those with a genuine interest in the hobby. On the other hand, mall shows go a long way toward promoting the hobby to the general public. Combine these separate events into one, however, and a unique kind of R/C show results: the Pot O'Gold R/C Show. The 1986 edition of the Pot O'Gold was the second such show presented by the South Bend R/C Club of South Bend, Indiana. Held at the University of Notre Dame Athletic and Convocation Center, Pot O'Gold '86 drew a large and enthusiastic crowd of 6,000.

Being that this was the club's second show, General Show Chairman Jack Allinger had valuable show experience under his belt when the planning started. Based on the overwhelming success of the first show, the club planned for a modest growth in terms of floor space. Efficient use of this additional space allowed for an increase in available dealer and swap tables, a larger static display area, and wider aisles.

Over 3,600 mailings and flyers posted in numerous hobby shops invited modelers, dealers, and manufacturers to participate. In addition, TV, radio, and newspaper coverage, and a mall display invited the general public to attend and see R/C in action. This advertising was well received; preregistrations reached 100% one week prior to the show date. Thankfully, the size of Notre Dame's ACC allowed a last minute show expansion to satisfy the additional demand. In short, not one exhibitor was turned away!

Several area R/C clubs took part in the show with promotion booths. Hobby dealers and manufacturers did a brisk business, as did the swappers. The AMA, the IMAA, and the Confederate Air Force also had displays. A local off-road R/C club held a demonstration race that was a big hit with the crowds, as was the R/C blimp that was flown in the adjoining basketball arena. Although the weather was not the best for flying (cold, windy, drizzle, and finally freezing rain!), R/C flying demonstrations were conducted and were well attended. The *Model Airplane News* booth and a man-carrying paraplane exhibit were also popular attractions.

The static display offered competition in eight categories of R/C aircraft, cars, and boats, plus "Best of Show." Some 80 models were entered and Dave Szromba of South Holland, Illinois, took "Best of Show" and first place in Giant Scale with a beautiful Der Jaeger biplane. All judging was done by the public on ballots provided at the door.

Several factors combine to make the Pot O'Gold such a big hit, including geographic location, the superb facility, and the talented SBRC club members. Organized in December 1983, the club consists of a group of guys that can tackle almost anything successfully. Of course, Jack sees to it that everyone takes part and gives it his best.

Plans are already underway for Pot O'Gold '87, tentatively scheduled for mid-February 1987. It promises to be bigger and better than ever. For more information, contact: Pot O'Gold Chairman, Jack Allinger, 244 Willow Dr., South Bend, IN 46637. ■

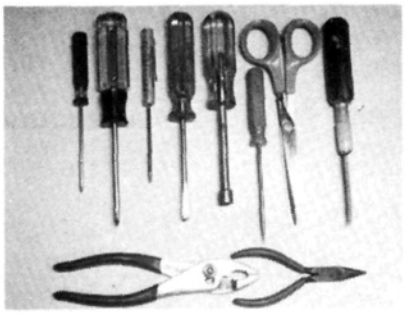
photos by BOB LONG

Left: Jerry Hicks took both first and second place in the helicopter category. Middle: Jim Lindeman was first i Military Scale with his Bearcat. Right: Bob Kistler was second in Sport Aircraft.

Building Your First R/C Car!

by Art Schroeder

A trainer or a simple vehicle is not needed; virtually any of today's kitted cars can be built and operated by a novice driver. The Cox Gallop is a case in point.



These tools are necessary for assembly of any R/C car. Overall cost is not high, so buy the best.

Zap Lock keeps nuts and bolts in their proper places. Plasti Zap was used to join plastic parts. Both were effective.

SO, YOU inadvertantly came upon a group running their little R/C cars in a parking lot and now you have a hankering to try those speed machines. The color, action, speed, and sound have really captured your imagination, but where do you start? A visit to your local hobby shop reveals dozens of cars and an equal array of radio systems. It's enough to boggle your mind! Still it looks like an awful lot of fun.

Well, I'm here to tell you that the beginning point is really quite simple to determine. In a nutshell, the first car for you is the style you like best at a price you can afford! Virtually any car in kit-form today can be built and run by any beginner. Of course, some are easier than others so let me make a few suggestions.

Road racers are not the best first choice, particularly gas-powered cars. They have minimal road clearance, are very fast, and require some background and experience to properly adjust. However, if your local group is into this kind of car, go ahead—they will be of far more help than I could ever be.

The foregoing immediately shows my preference for beginners—electric-powered off-road vehicles. In the alternative, I find that trucks and jeeps are also great beginning points. Which brings us to my most recent project, the Cox Gallop; a four-wheel drive, four-wheel steering, off-road car that is simply great!

Lest anyone misunderstand, I don't place the Cox vehicle as an absolute starting point. Indeed, I have seen a number of off-road or truck types from a variety of manufacturers that would do just as well for beginners. MRC's Ford Ranger and Wild Willy are examples. Nor does my suggestion that these cars are suitable for beginners make them lesser vehicles; they are also thoroughbred racing machines for experts. Simply stated, expert drivers will get maximum performance but beginners will be able to effectively learn on cars such as the Gallop.

The Cox Gallop includes finished parts in nylon and metal that fit perfectly. Most of the building is done with nuts and bolts and self-tapping screws. Some cyanoacrylate glue is used and a bit of thread-lock liquid is used as well. All parts are bagged or displayed in heat-shrink containers and are keyed to the instructions. Most importantly, the instructions are well written, logical, and carry you through assembling the Gallop to a finished car in under 10 hours. Not only is the verbiage well done, the isometric drawings make it virtually impossible to make a mistake.

Why do I suggest off-roaders? Frankly, they're fascinating to build and all I've seen come in complete kits (except for radio, batteries, and some paint)

Cox Gallop Four-Wheel Drive, Four-Wheel Steering Off-Road Racer

color photo by Louis V. Defrancesco Jr.

This is an off-road car for everyone and anyone—easy to build and adjust—easy and exciting to operate!

THE COX HOBBIES* Gallop is a four-wheel drive, four-wheel steering (4WDS), electric-powered off-road vehicle that is simply super in presentation and operation. The four-wheel steering is unique in model cars and, while a bit more complex than conventional steering, it provides some definite advantages in off-road racing.

The Gallop has a chain drive through two differentials, along with independent rear suspension and front torsion bar suspension on a double wishbone. The car is absolutely designed for off-road racing with the ability to keep all wheels on the road and to handle just about any shock thrown into its chassis.

The kit is principally made up of beautifully molded nylon parts with metal employed at strategic positions. All parts fit perfectly. Indeed, if something didn't fit, it was the wrong part. Assembly took an enjoyable 10 hours, but others may be able to do the job in less time.

Power is provided through a 7.2-volt battery with 1,200-mAh capacity to a Mabuchi RS-540 S motor. The car wheelbase is 10.3 inches, with an overall length of 15.6 inches; overall weight is 58 ounces, and it is balanced so that 60% of its weight is on the rear wheels and 40% on the front.

The instructions are among the best I've seen. Not one deviation from those instructions was needed. I can only provide the caution that you should be very sure of the polarity discussed on page 16. This is a black/white presentation, yet positive voltage to the speed controller could be misunderstood. On page 16, the black lead is the positive one! I also caution builders to be sure that (page 18) the inner ring used is the proper one for the tire being assembled.

Outside of that, everything went together perfectly. That perfection was seen in the flawless running of the Gallop. I established all adjustments as outlined and the results were fine. Although I've not yet raced the machine, I see no reason why it should not do well.

One characteristic that was outstanding was that I could not spin the Gallop on any turn no matter how "hamfisted" I tried; a tribute to design and balance. The four-wheel steering gave Gallop an unusually tight turning ability yet, as adjusted per the instructions, it was quite easy to hold the car on a straight course.

In truth, the Gallop is an almost perfect machine for both novice and expert. Not only do the instructions tell you how to assemble the car, but they include tips on tuning and installation of options for out-and-out racing. I can recommend this car to anyone—I certainly had a ball with it.

*The following is the address of the company mentioned in this article: Cox Hobbies, Inc., 1525 E. Warner Ave., Santa Ana, CA 92705. ■

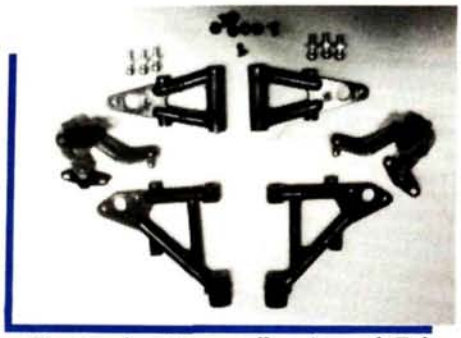
with well written instructions. When completed, off-roaders can be run almost anywhere; your backyard, driveway, or a local parking lot will serve nicely. They're maneuverable and give the added dimension of jumps and even wheelies. A regular track racer requires a very smooth surface that might not always be available, and it definitely requires other cars to race with. Without the elements of a race, a road racer can quickly become somewhat boring—an off-roader holds your interest as as you simply try to negotiate a rough course.

Why do I suggest electric power? Simply, electrics are less complicated to operate. If you have prior model engine experience you might want to opt for a gas car. I have many years of experience but I still prefer the electric cars—they are cleaner, quieter, simpler, and just as much fun.

Once a choice has been made, the rest of your problem is assembly and operation. I have yet to see a model car that goes beyond the ability of anyone who can read and use a screwdriver and a pair of pliers.

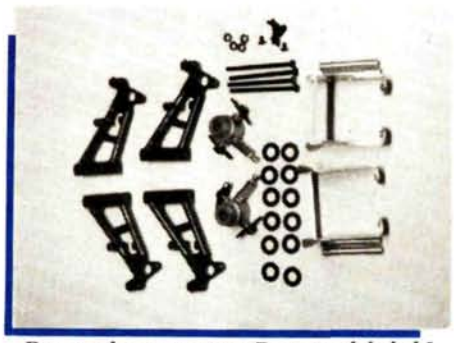
When a car kit is first opened, the myriad of parts can really set one back. Don't despair! It is all very simple and should be thought of as a large, three-dimensional jig-saw puzzle. Although there are many parts,

Building Your First R/C Car!



Front-end parts are well engineered. Take care to insure right and left positioning.

Front-end differential. Note gear on left for chain drive.



Rear-end components. Parts are labeled L and R to insure proper positioning.

they all fit in a specific place to perform a specific function as specified in the instructions.

That is to say, read the instructions over and over again. At the same time, try to relate those instructions to the bagged parts and larger parts you can see. Once you are comfortable with them, read the instructions again. I've built numerous Tamiya (MRC) and Kyosho (Cox) vehicles; in all cases the instructions were superb! Above all, don't start spreading parts out by un-bagging them—such procedure will cause a lot of problems and confusion. Parts bags are usually keyed carefully to the instructions and should be opened only when a certain step is reached. Once opened, I suggest you keep the parts in a small plastic cup until you need them. One thing most important to successfully assembling an R/C car is organization—keep this in mind.

To assemble an R/C car you need a flat work surface of at least 48x24 inches. This place should be yours and one that no one else will disturb. Almost any area is okay since R/C car assembly is basically a very clean activity. Just be sure it is a place not needed by anyone else for several weeks. Not that an R/C car takes that long. I've never spent more than 18 working hours on any car I've assembled, and that includes most of the popular machines running today. However, spare time is sometimes hard to come by, so a safe area where things can remain undisturbed over time is necessary.

The number of tools needed is somewhat embarrasing for something that seems so complex. I completed the Gallop with nothing more than a small and medium Phillips screwdriver, a pair of needle-nose pliers, an adjustable wrench, a small slotted screw driver, an X-Acto knife, a lightweight soldering iron and rosin core solder, a small wire stripper and cutter, one small brush, and that's it. The tools were worth, perhaps, $35. One caution—be absolutely certain your screw drivers (slotted or Phillips) fit the screws in your kit.

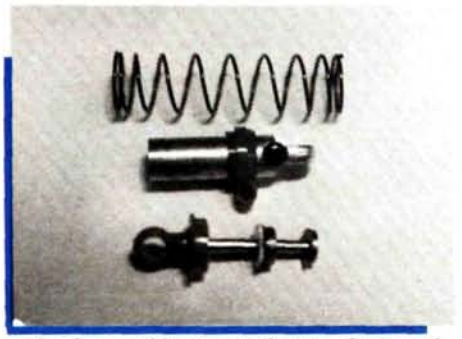
Most kits don't include paint, but there are a variety of plastic paints available at most hobby shops. The acrylic or polycarbonate paints are best for R/C cars; all apply beautifully with a brush.

I can't in one short article carry you through the assembly of any given car, but the instructions will. Proceed carefully. If any part doesn't fit, re-read the instructions. Any foul-ups are usually because you selected the wrong part. Follow the instructions to the letter—and that includes following the order of assembly. Any deviation will usually cause you problems.

The front-end of Gallop is molded of rugged heavy-duty nylon.

Rear-end wheel bearings and steering knuckles. Ball bearings are an option that can be included.

Completed rear end and motor assembly. Note chain drive and universal shaft to rear wheels.



Shock assembly prior to the introduction of damping oil.

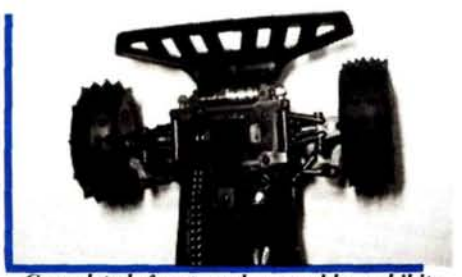
Gallop speed controller provides 3 speeds forward, 1 reverse, and receiver voltage.

Usually any oils that you need are included in the kit, along with a thread-locking cement. Again, follow instructions as to their use. Oils won't cause you a problem, but thread-lock fluids can attack plastic—a principle material in R/C cars. Whenever using a locking fluid on a metal-to-plastic connection, be very sure the fluid does not attack the plastic. Usually there is some scrap plastic on the "tree" from which parts are cut that you can test paints and cements on.

Tighten all nuts and bolts firmly with an appropriate screw driver while holding the nut driver with a pair of pliers. Avoid tearing up screw slots! Not only does that give you an unsightly job, it also makes removal difficult, if not impossible. Self-tapping screws into plastic should be firmly set, but not so firmly so as to strip out the plastic threads. Most nuts and bolts are safety-set with a thread-lock cement; most screw/plastic connections will not call for this. The instructions will guide you to spots that use thread-lock cement.

As for radios, start with a two-channel, proportional radio with two sticks or a wheel. I strongly suggest that you get a set with rechargeable nickel-cadmium batteries, as the purchase of many sets of alkaline dry cells over extended running will soon sour you on the entire sport. In my opinion, nickel-cadmium batteries are the better value. If possible, get your radio with servo-reversing; a most useful feature that will become obvious the first time you set up a car.

So that's it. You can assemble anything you want with a minimal number of tools and a limited work space. No skills beyond the normal ability to use a screw driver and to read instructions are needed. It is a hobby/sport for everyone—and anyone. ■



Completed front end assembly exhibits ruggedness and shock absorbing design.

Complete Gallop chassis. Vehicle is both four-wheel drive and four-wheel steering.

Four-Cycle Forum

by ELOY MAREZ

TACHOMETERS. I should have learned to leave well enough alone because the last time I wrote about tachometers I received a scalding letter from one of their manufacturers. However, I feel very strongly that if through personal use I've found some limitations with some item, I must share that with you the same as I would if I found some good points.

There is another kind of tachometer available to modelers. Since I've always found that lacking torque meters, manifold pressure gauges, and other engine instruments available in full-scale aviation, the best tool we have to help us measure the performance of our engines—or related items, such as a different fuel or propeller—is the tachometer. I feel that the popularity of four-cycle engines makes the tach even more important. Due to the unique sound of the four-stroker, and the fact that most beginners insist on leaning them out trying to make them sound like their old two-cycles used to (and burning them up in the process), it makes a lot of sense to get some help with the needle-valve setting. At least until you get your ear recalibrated!

Anyway, I want to tell you about a not-so-well-known rpm reading instrument. Actually, it's not new. It's been around for many years and could easily be the first model engine tach seen or used by a lot of early modelers. It's called Vibra-Tak, it's from Verdell Instrument Sales*, and it's described as a slide rule tachometer. Its maker has been in this business for 35 years!

Quite different from our optical pick-up or those tachs that require direct mechanical contact with the revolving part, the Vibra-Tak operates off the vibrations present in most rotating devices, and certainly in model engines.

The Vibra-Tak consists of a handle on which the rpm markings, in thousands, are clearly marked far enough apart to allow accurate interpolation, and a sliding, flexible wire reed.

The Fowler Slo-Tak is a simple instrument with an accuracy of plus/minus 5%.

In use, you place the forward part of the handle against any part of the engine and adjust the slide as you watch the reed. Setting the reed at an rpm reading close to that of the engine will cause the reed to vibrate. Further adjust the slide for maximum reed spread, at which time you can remove the instrument from the engine and read it at a safe distance. The rpm reading is held until the slide is repositioned.

Single-cylinder four-cycle engines require a simple divide-by-half adjustment; however, the use of three- or four-blade props, or fans in the case of ducted-fans, does not require any mathematical adjustment to the reading obtained.

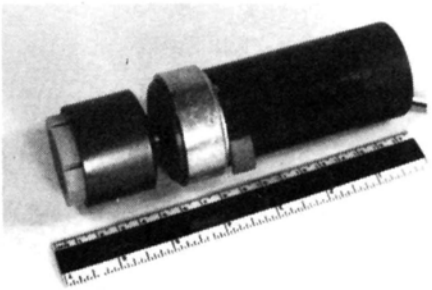
The basic Vibra-Tak covers the range of 2,000 to 21,000 rpm. Another slow speed model, called Slo-Tak, is available for measuring the vibrations on rotating shafts. Accuracy of the instruments is advertised as plus-or-minus 5%, which in my experience is as good as that obtained with a rapidly blinking digital tachometer or an analog one on which you are expected to read 0 to 25,000 rpm on a small-scale instrument.

The Vibra-Tak is priced at $11.95, the Slo-Tak at $17.95. A Duo-Tak Pak, containing both instruments in a carrying case, is priced at $27.95.

Next month I'll continue this discussion with another tachometer, one that lets you take that all-important measurement while in flight. Be there!

Four-Cycle Engine Life

Back in my April column, I discussed some problems that members of the Pioneer Valley R/C Club in Massachusettes have experienced with their four-strokers. As I stated then, I sent a copy of their letter to the makers of the engine with which they reported the most problems, and said that I would share any information I received with you. I have nothing to share, yet. My letter has gone unanswered. I can't accept this as a language problem—the engine in question is made in Japan. I hope they care enough to reply.



The Kavan geared starter is ideal for four-stroke engines due to its slower rpm and high torque.

However, I did hear from another reader, Elwood Leeming, of Marstons Mills, Massachusettes, with some comments on the subject. He writes:

"I am writing in regard to Ron Gamelli's problem in your April 1986 'Four-Cycle Forum.' I am having the same problem with an O.S. FS-61. A check with a technician at 'Hobby Services' suggests that when the engine is running, the pressure will hold the valve closed. Also, don't grind the valves.

"My engine will turn over 10K with a

12x6 prop, and that's acceptable to me, but it's hard to start and will not idle well. I have an Enya 46-4C, and an O.S. FS-90; both have good compression."

Elwood's letter immediately raises a question in my mind. Who and what are "Hobby Services"? I'm not familiar with the organization, and if they will contact me and tell me about their services, I'll be glad to share the information with *M.A.N.* readers.

Next, I'd like to repeat something that I've mentioned before. When you're having the kind of troubles described above, remind yourself that yours is a model airplane engine and it's subject to the same ills that were suffered by the old Brown D. Hard starting and a poor idle can be caused by something as simple as a loose screw on the rear cover. In other words, look for the obvious things that would affect any engine before you start trying to search out some obscure and exotic four-cycle problem.

This isn't to say that four-strokers are not without troubles. We (you, and I, and the manufacturers) don't seem to have everything as well under control as we do with two-cycles. We are all still learning and probably must share the blame for some of the reported mechanical breakdowns. A very well known and respected modeler and model industry leader told me once that he considers four-cycle engines to be a fad, which, like all fads, will pass. To say that I was surprised is an understatement, and while I don't exactly share his feelings, I cannot disagree with the fact that we have seen fads in our hobby before and probably will again. High prices, difficulty in operating, mechanical breakdowns, and short life spans will certainly cause the demise of an engine, regardless of the number of cycles!

(Continued on page 113)

Jet Blast

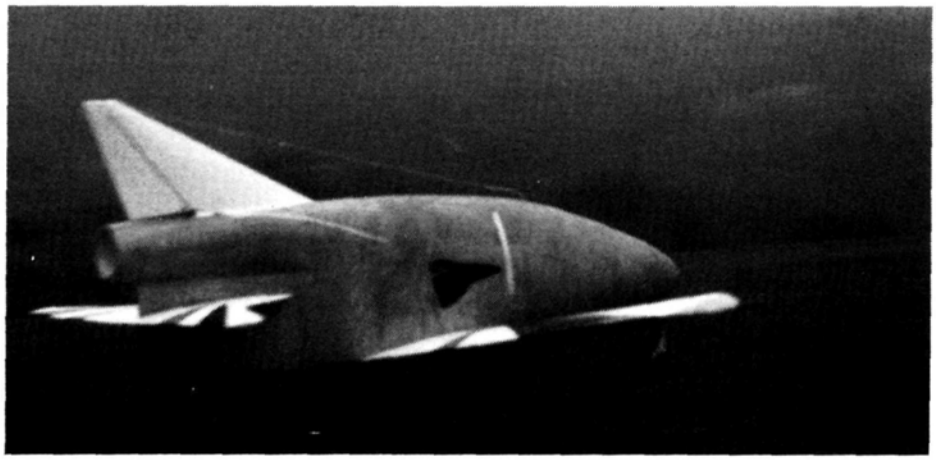
by RICH URAVITCH

LET ME START this month's column by correcting some information I ran in the April issue. When covering some activities of our Canadian neighbors, I indicated that they were flying Me-262s built from the Air Flair* kit. To set the record straight, Air Flair Manufacturing Company can still supply you with a kit for the tidy sum of $295. Contact Richard Jennings at Air Flair for details.

Kerry Sterner of Sterner Engineering* has been busy with new things. In addition to producing his very successful F-80 and T-33 kits, he's been experimenting with some unique fan arrangements using belt drives. He's promised to let me know more as testing proceeds. What he has shown me are pictures of his ½-scale BD-5J! That's an 8-foot, 6-inch wingspan with a 6-foot fuselage. Its all-foam construction produces a flying weight of 17 pounds which is pushed by a Byrojet/Rossi .81 combination. Kerry claims it's just a design exercise right now, but I know lots of kits that started as "design exercises."

The Kress* RK-740, which is a great little unit but also at times frustrating during assembly, is now available built up and ready for installation. I recommend that you purchase yours this way, as it's certainly worth the $50 Bob charges for the service. I've had the chance to build both configurations (original cast mount and current stamped steel "cup" type) and have concluded that the original is still easier, requiring a lot less "Dremeling."

While on the subject of the RK-740, I thought I'd show you a throttle linkage arrangement which I devised for my O.S. .46 installation. It should work equally as well for most rear intake engines. Two brackets are attached to the exterior of the shroud, picking up the stator screws. These brackets form guides for the cable/conduit assembly. A servo arm is used as a bellcrank and is attached to the center body tube by a nut/bushing/bolt combination. Clevises and ball links are used to connect everything together. It works like a charm and is adjustable.

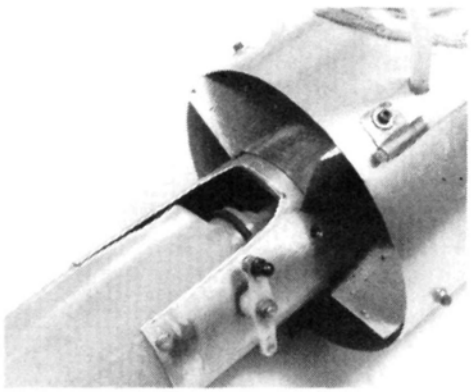


A ½-scale BD-5J by Sterner undergoing flight testing. See text.

Word is that the folks at MRC* will now be handling at least some of the Rossi line. The new .90 fan engine is producing nearly 6 horsepower (that's not a typo!) at 22,000 rpm! This kind of escalating power, while welcomed by those of us looking for even higher thrust levels, should be treated with even greater respect and, as I've said before, greater care must be exercised while engaged in our hobby. Without climbing on a soapbox, the current visibility of product liability claims, and sometimes outrageous settlements, have already caused a number of major companies to either close down or raise the prices of their products to absorb the incredibly high insurance premiums. I don't know of any manufacturers supplying our industry who have shut down because of this *yet,* but we must recognize the potential, so "Let's be careful out there!"

I need some help, guys. Like I keep saying, I can't do it all. In order to keep

The Kress RK-740 unit modified for O.S. .46.



Throttle linkage devised by author should solve some problems.

this column as factual as I can, I want to present only that material which is supportable from multiple sources. In order to do this, I will occasionally ask a question of you, the reader, which started as a question from you to me. If I receive the same question from lots of folks, I assume others are interested. Here is this month's question: "Has anyone seen any of the Jet Age Model Aircraft kits fly?" I'm asking specifically about the F-14 and the Lear. These are two really popular airplanes and a lot of you have asked my opinion before you plunk down your bucks. What's the general quality of the kit? The plans? Ease of assembly? C'mon, guys, I can't build and fly everything—let's here from you.

Terry Best from Fenton, Missouri, stopped by to chat at the Toledo show and gave me a couple of pictures of his F-4 built from the Ziroli plans. Terry says it flies great and he went on to mention that he's using a simple fan that consists of a cut down JHH* Turbax rotor driven by a 7.5 inside a length of 4-inch diameter PVC pipe. No fuss, no muss! I'll try to get additional details to pass along. Mike Kulczyk had talked about a "poor man's fan" long ago—looks like Terry has broken the ice.

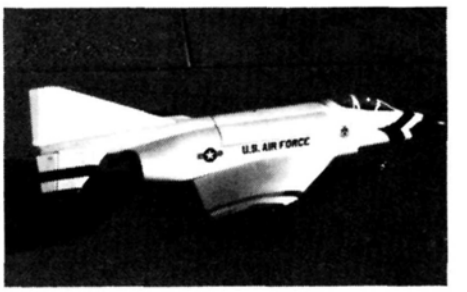
Speaking of breaking things, I thought I'd show you the remains of Mike Kulczyk's RK-740/O.S. .46 unit after his HOB F-86 augered straight into the unforgiving concrete. Not many usable pieces, but who expected any after impacting at warp 3?

Coming Events

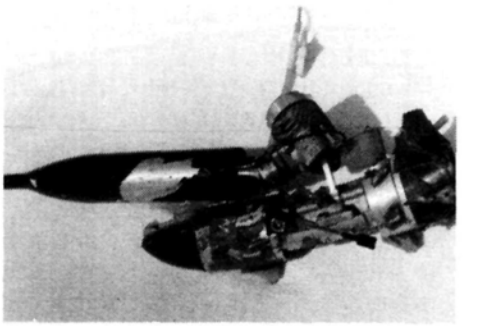
The 3rd Annual Byron* Jet Rally will be held on June 21 and 22 in Ida Grove, Iowa. This year's rendition will follow the successful format of the last two years with "fun flying," the "Striking Back" extravaganza, and other visual attractions, including Bob Bishop flying the Silver Bullet BD-5J. I saw his show at Oshkosh last year and it's super! I spoke with Byron at the Toledo gathering and he informed me that a prototype BD-5J model is scheduled to be flown also. It's equipped with clamshell-type thrust reversers like the original and should be pretty neat. No definite word if a kit is forthcoming but I'll keep you advised. I may cover the event again in a future issue.

Moving slightly East on July 12 and 13 is the premier "Indy Jet Scramble '86." Dave Bloomer* tells me a "fun-fly" format will be used with door prizes and pilot's choice awards up for grabs. Bob Violett and Tom Cook are scheduled to be there and will conduct workshops on Sunday morning. So stick the pin in your contest map on Indianapolis and make plans to attend. For additional info, contact Dave Bloomer.

Terry Best demonstrates his method of hand launching his latest effort.



Best's F-4 was built using Nick Ziroli plans.



Mike Kulczyk wonders if he can get an exchange on his O.S. .46. See text.

For peak performance, stay tuned!

Rich Uravitch, c/o *Model Airplane News,* 632 Danbury Rd., Wilton, CT 06897.

**The following are the addresses of the companies and people mentioned in this article:*

Air Flair Mfg. Co., Box 11702, Kansas City, MO 64138; 816-353-7854.

Sterner Engineering, 661 Moorestown Dr., Bath, PA 18014; 215-481-7448.

Kress Jets, Inc., 27 Mill Rd., Lloyd Harbor, NY 11743; 516-421-1564.

Model Rectifier Corporation, 2500 Woodbridge Ave., Edison, NJ 08817; 201-985-7800.

Jet Hangar Hobbies, 12554 Centralia Rd., Lakewood, CA 90715; 213-860-7612.

Byron Originals, P.O. Box 279, Ida Grove, IA 51445; 712-364-3165.

Dave Bloomer, Indy Jet Scramble, 604 S. East St., Plainfield, IN 46168; 317-839-4449.■

The Golden Age of R/C

by HAL "PAPPY" deBOLT

I AM RAPIDLY approaching the end of the "rudder-only" era. This is the point where R/C really exploded with the help of CB and the manufacturers whose kits made entry simple for most all modelers. Before the R/C explosion, remember, you not only had to assemble your radio but you also had to design and scratch-build the airplane! For real progress, kits were needed.

Berkeley Models had supplied kits in the initial stages that could be used for R/C, like the Buccaneer, the Brigadier, the Cavalier, the Piper Cub, and the Rudder Bug, but the special R/C designs were the ones that struck the fancy of CBers. The Live Wire developed into a series of designs to suit all desires: the Senior, the Trainer, the Cruiser, the Champion, the Super Cub, the Kitten, the Ercoupe, the Rebel, and the Yankee.

Midwest Products offered the Esquire in several varieties which were similar in design to the Live Wire. Another design of similar nature was the Krackerjac by Jasco, designed by Bill Winter, who still enjoys it in various sizes today.

One design that had a much different appearance was by Lou Andrews for Guillow Models. The Trixter Beam was similar in size to the widely accepted Live Wire Trainer and became very popular with new R/Cers. Lou had gone to aerodynamic extremes to obtain the needed R/C ability, which gave the Beam a "guppy" appearance and delightful performance.

With R/C in its infancy, scale designs seemed the least logical choice for a starter, but Sterling Models had considerable success with their Tri-Pacer, both with sales and flights. It was an early bird that would fit right into today's scene. Another popular Sterling kit was the Mambo, a shoulder-wing box style which might have inspired the later, highly successful C-G Falcon series.

For years R/C kits were American-made with considerable quantities being exported. It was nothing like today where we see so many imports.

Henry Stiglmeir from Englewood, California, a famous West-coast gas model expert shown here at the Detroit 1938 Nationals, used a design that was the basis for later radio control applications.

There were "hot spots" in the U.S. where R/C progress was rapid and our early leaders got their experience. In the East, the Washington, D.C., area DC/RC club led by Walt Good was very prominent. Don Clark and Maynard Hill cut their teeth early on Rudder Bugs with this club and did considerable experimenting. The DC/RC club was noted for its development of the so-called "pulse" systems, which provided a form of proportional control and eventually multi-control.

In western New York, Detroit, Indianapolis, and Kansas City, there was rapid growth also, but most of the effort was with store-bought equipment until the advent of multi-control.

Something similar happened in the West and many of the major equipment manufacturers were eventually based there. People like Henry Stiglmier, Dean Kenney, and Howard Bonner added a lot to airplane development. Howard was joined by the likes of Don Mathes, Phil Kraft, and Bob Dunham, who pushed equipment advancements right through to the best of what we have today. It's notable that these were modelers who were equally successful on the contest circuit and in their commercial endeavors.

R/C had its growing pains for years before we got to today's conditions of just charge and fly. For example, dry batteries were a constant headache; you had to be sure of a fresh supply, you had to know when to replace them, and the cost was a constant burden. This held true throughout the single-channel period. We were deeply into multi-control before nickel-cadmium batteries became available.

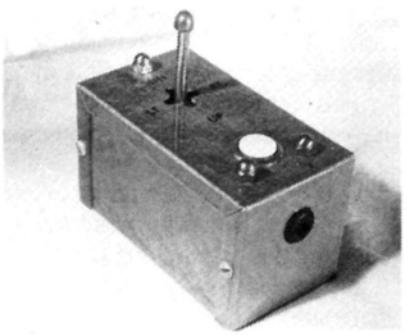
Coding the transmitter signal was originally done with the thumb and a

Dean Kenney (left) of Los Angeles, California, used a modified Fox .35 in his early R/C Nats entry. The famous Howard Bonner (right) poses with his 1951 Nats entry.

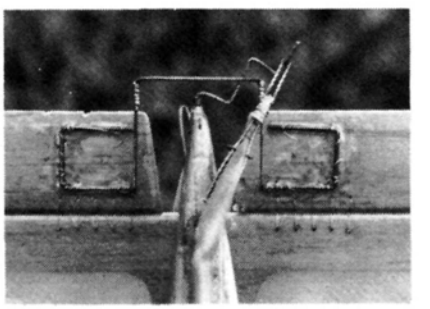
push-button switch, depending on the pilot's dexterity for accuracy. With one control and a slow actuator, it was no problem; but use a more complex code and higher speeds and you had a more reliable machine. The answer was quickly labeled "beep box," and it replaced the transmitter control switch. In makeup, the beep box could be compared to the typical Swiss music box. In fact, some of the early attempts used music box components. Essentially there was a motor-driven drum which mechanically operated a transmitter signal switch. There was a control stick that moved right and left from neutral. Moving the stick to a position allowed the drum to revolve and "beep" the desired number of signal bursts to correctly index the escapement. The switch operating drum cam dwell created the ideal length signal to suit the escapement in use—with no human factor!

Obviously coding was more complex with the compound escapements and auxiliary controls. The simple beep box operation was expanded with an up-and-down stick movement added as an example. The last versions of these control boxes replaced the mechanics with electronics which, via stick command, told a relay the desired sequence.

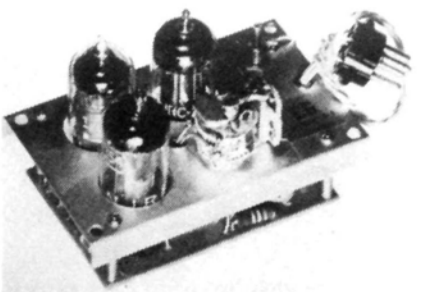
Those who took the pulse systems route *had* to have control boxes. The typical basic pulse system used a Mighty Midget electric motor as the control actuator. The rotation was restricted to about 120° by stops. The receiver used a double throw relay, one contact for clockwise motor rotation, the other for counterclockwise. This resulted in two-way control action. The transmitter control box had the usual signal switch, which was operated by a motor-driven cam action or electronics and a relay switch. Either way, the device provided the ability to select the length of "on time" for the signal.



Early radio setups used separate control boxes wired to the transmitter.



Early control systems arrangement. Note sewn thread hinges and control actuator.



An early example of a typical receiver. This one a model R-1 by CG Electronics of Albuquerque, New Mexico.

Flying fields in the early days preferably contained high grass as models were generally hand-launched.

With no signal at the receiver, the closed relay contact directed the motor to turn in one direction; *with* a signal the other contact closed and the motor revolved in the opposite direction. The control box constantly pulsed the signal on and off, resulting in the actuator motor and control surface continually fluttering from right to left.

With equal movement the airplane saw this as neutral. This neutral position required the on and off signals to be of equal time length. If either signal was even a split second longer than the other, the motor and control surface would stay to the one side that much longer. It was the difference in signal time that determined the amount of deflection. With an infinite ability to change the signal on time via the control box stick, the control effect related to the stick position, thus there was proportional control!

Along the way the Mighty Midget motor gave way to specialized pulse actuators produced in small quantities. One of the most noted was the Adams Actuator marketed by Ace R/C, which was popular for many years for use with small planes. Most used two electromagnets which flopped the control from side to side, similar to the motor.

In operation these were called "wig-wag" or "flip-flop" systems because the tail was constantly "wagging." When some genius wire bender found a way to couple the elevator with the rudder crank, the resulting flight was aptly labeled "galloping ghost," because the plane's flight path sometimes looked like a horse galloping along!

So what happened to the concept? Basically there were shortcomings. First, it was difficult to expand into multi-controls and the practical amount of actuator power limited it to smaller models. Then there was wear and tear throughout the system with the constant motion and with the need for precise signal timing, just a speck of dirt in a relay contact could upset the apple cart. Happily, other, more practical developments came quickly.

One historical point is apparent here and it relates directly to modern R/C systems. The fundamental concept of our digital systems is the ability to vary the time length of any control signal within the coding. The value of this concept was neatly demonstrated by these early, crude pulse systems!

Another early headache was interference. Depending on only one transmitter signal (radio frequency or RF) for control coding meant that any foreign signal near that frequency could easily interfere. With CB communications so widespread, the chance was good. The same solution prevails today; send a constant RF signal so that it can't be disrupted, use this as a carrier, and superimpose another signal upon it with the coding.

With the development of the basic hard tube receiver, the means to do this were at hand. Another stage was added to the basic receiver, which detected the coded audio tone which was imposed on the carrier frequency. Now it was the audio which operated the relay, not the RF. It would take two forms of interference to create a problem. Further protection and improvement came with the switch to super heterodyne circuits where the initial RF was changed after detection and before decoding began. This allowed the receiver frequency response to be narrower while amplifying the coded audio tone for more reliability. Modern receivers are much more complex; they reject all sorts of "noise," and accommodate multi-channels and the digital coding. However, it's the original concept that makes it possible for us to operate in today's crowded airwaves!

The Astro-Hog was the hottest thing for its time.

This column is now old enough to have an initial response. The number of letters I've received is encouraging and from them I see definite trends in interest. Happily, all you who write say you're enjoying this column and that it's something needed to find some trends that were unknown.

Your letters show a positive interest in R/C history, especially the models and

(Continued on page 119)

Sterling Models had one of few early scale R/C models. This one the Piper Tri-Pacer.

Pattern Matters

by MIKE LEE

BY THE TIME YOU get this issue, most of you will be into flying the models you built last winter. With this in mind, I'll start off with a letter I received from Stephen Autry of San Antonio, Texas.

Among other things, Stephen asked two rather interesting questions, the first dealing with fuel pressure systems and the other with a more personal touch.

Stephen was trying to find information on the Magic 60 aircraft which has appeared in this column. The Magic uses an inverted engine and Stephen was wondering what kind of pressure system was used, especially considering the high tank location in the aircraft.

Well, Stephen, most pilots elect to use the most readily available pressure source, muffler or pipe pressure. The amount of pressure from a muffler isn't as great as that from a pipe, but both muffler and pipe will provide sufficient pressure to the carb in almost any flight attitude.

Pressure taps from the muffler are pretty much determined by the engine or muffler manufacturer. If there isn't already a pressure fitting, there's usually a small flat spot on the muffler where one should be placed.

The pressure tap from a tuned pipe, however, isn't normally present in a majority of pipes. While the manufacturer might supply one in the box, there is no telltale place for one to be fitted. This is because there is a bit of personal preference involved. You can place the pressure tap anywhere you want on the tuned pipe, and still receive a significant amount of pressure.

Most pilots will elect to put the pressure tap in one of two places: either on the header or on the high point of the pipe. It's generally agreed by most pattern doctors that pressure from the header isn't as great as the amount of pressure from the high point of the pipe. In fact, the pressure from the high point of the pipe can, and normally will, cause the fuel tank to bulge slightly when at full tilt. The only problem when using any pressure tap from the exhaust end of an engine is that the pressure is only good when the engine is running fast. There's virtually no pressure when the engine is at idle.

Larry Thompson does well in Sportsman Class with original Phazer design and O.S. .60 engine.

A second, but not often used, method of pressurizing the fuel system is using a pressure tap from off of the rear of the engine crankcase. This method of pressurizing is effective at all rpm ranges of the engine, but has the problem of gaining access to the pressure line when refueling the plane—lest one wants to flood the engine while refueling.

Crankcase pressure is normally used in racing where the engine runs at full bore 95% of the time with little or no concern about flooding the engine from excess pressure when throttled back. Unfortunately, flying pattern compels you to use that throttle, and the variation in pressure from high to low normally causes some flooding problems.

The third pressure system is the fuel pump system. There are a number of fuel pumps on the market. The pumps made by Perry Aeromotive* are some of the most well-known and come in two distinct types; the diaphragm type and the vibrating piston type. These pumps have enjoyed good success over the past decade.

Fuel pumps have also been made a part of the engine itself, again bringing to mind the Perry pumps and, of more recent popularity, the Y.S. .60 engines which sport a pump mounted on the front rotor. The Perry pumps became popular mounted to the rear of K&B engines, notably the .40 and .60 sizes. Both the Y.S. and Perry engine-mounted pumps are dependable and perform well.

Tim Lime of Phoenix, Arizona, does well in pattern and pylon for an 11-year-old.

Even though you use a pressurized fuel tank or a fuel pump on your pattern bird, it still can't be the almighty cure of fuel feed problems. You will still have to keep the tank mounted as close to the centerline as possible (in relation to the carb), and you will still have to keep the fuel lines as short as possible. Just because the plane has a pump or high pipe pressure doesn't mean you can throw care to the wind. In any case, give that engine every chance possible to feed itself properly; it's expensive and one lean run is all it needs to ruin your day.

Stephen's second question dealt with whether the Magic 60 aircraft would be too much for him to handle in AMA Sportsman class. Let me just say that an aircraft, any aircraft, can be too much for anyone to handle if they don't know what they're doing. Certainly, the Magic and a host of others are capable of being terribly fast in the air and beyond the flying talents of a good number of pilots.

However, with time comes experience, and experience will be a governing factor as to whether a pilot can handle a "hot" ship or not.

Other factors come into play under the heading of experience. A pilot can have over ten years of flying under his belt, and might never have flown a pattern ship. On the other hand, a pilot might have learned to fly on a Quickee 500 and will find a pattern bird a bit slow to react. It all depends on what the pilot has flown and can fly that determines whether the ship is too "hot to trot," or too docile to dance.

Now, as far as the bird being too much for flying in any given class, that's another story. The rule book says nothing about the speed an aircraft must fly at or its maximum speed. In this case, the Magic, or any other pattern rocket, can fly in any class, provided it meets any applicable rules for size, power, and weight. This is with the exception of AMA Novice class, where a pipe and retracts are not allowed.

Performance with the classes is the criteria by which you will be judged. As per the rule book, judging is done upon the conceived idea of what the maneuver looks like and how realistically it's performed. In other words, the judge conceives the loop maneuver as a circle. No doubt, the pilot sees it this way as well, but it's an unrealistic performance when the aircraft pulls a 30-foot loop while traveling 100 mph. The G stress imposed on a full-size airframe and pilot would certainly exceed the limits of both pilot and plane. A more realistic size loop would be closer to 250 feet performed with grace.

So, it doesn't matter whether you fly the fire-breathing pattern rocket we all love, or a 12-year-old Quick-Fli III. If you log enough experience and practice with a single aircraft, it will bring you to the winner's circle. Perform the maneuvers realistically and according to the book, and you stand as good a chance as the next pilot of getting the win.

Electric Aerobatics

There has been much talk about the Electric R/C classes of competition on a world championship level. One of these classes may be Electric Aerobatics. This is exciting because not only does this country have a wealth of good pilots, but we also have access to some of the finest electric propulsion systems anywhere.

The way I see it, American pilots could easily develop highly capable electric aircraft and leap into the forefront of R/C aerobatics once again. My plans are to take a .40-size wooden-construction pattern bird and begin electric flight testing within a short time. How about the rest of you? Drop me a line on your thoughts about this class of pattern.

New Building Materials

For those of you builder/pilots out there who are having a tough time finding unusual materials for construction, I've found a source you might want to check out. Model Research Laboratories* has lots of exotic building materials to help strengthen your pattern bird or your indoor free-flighter. MRL carries such materials as carbon fiber, Boron, Kevlar, and standard fiberglass cloth.

Mike Delponte (l) and Darwin Barrie (r) both fly semi-scale Citabrias in Novice pattern.

These space-age composite materials are amazingly easy to use and can add incredible strength to critical areas of the ship, such as the retract bay area in the wing. Most pattern birds that suffer a wing failure will have it happen right there. Adding carbon fiber strands will strengthen the area over 400% (based on comparison strength factors of balsa verses carbon fiber).

Bill Hampel flies a Magic Arrow by combining a Magic wing with an Arrow fuselage.

MRL also carries engines, kits, an assortment of hot .049 Cox engines, an informative little catalog of their complete line, plus handy tips for the space-age modeler.

Mike Lee, c/o *Model Airplane News,* 632 Danbury Rd., Wilton, CT 06897.

**The following are the addresses of the companies mentioned in this article:*

Perry Aeromotive, 1568 Osage St., San Marcos, CA 92069.

Model Research Laboratories, 25108 Marguerite Parkway, Mission Viejo, CA 92692. ■

by CHRIS CHIANELLI

Cox Canario

A new generation of silent excitement.

OKAY, LET'S FACE IT. There are some aspects of flying glow-powered models that leave a little to be desired. How about the noise that in some people's minds makes us nothing but an annoyance, or the paraphernalia that is needed (but often left home) that must be dragged to the field to start the engine, or the occasional cranky engine that resists starting in spite of all your field equipment? And don't forget the most common nuisance, the oily mess that's so good at collecting grass, dirt, or whatever that must be cleaned off.

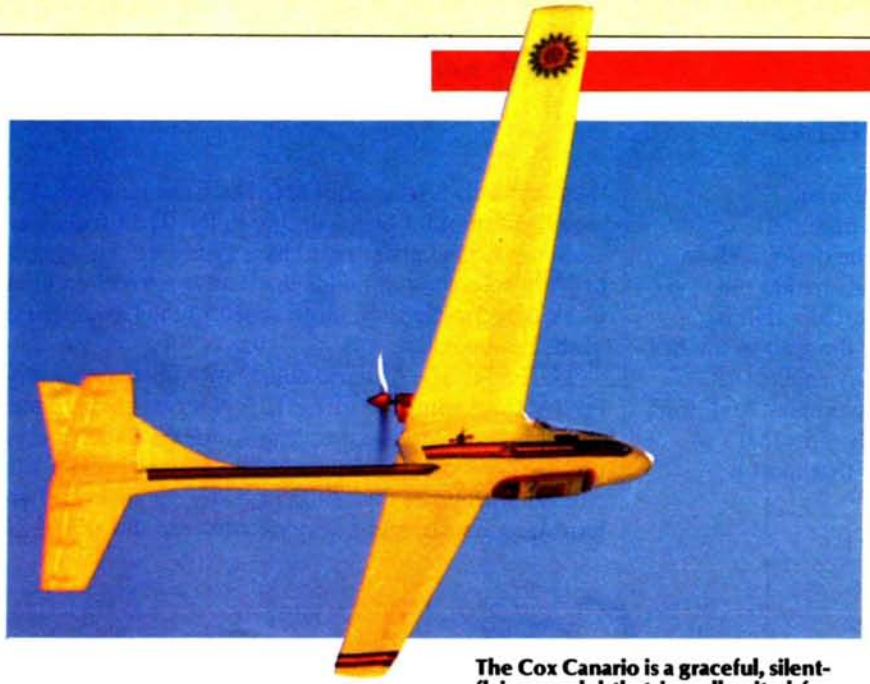
Please don't get me wrong, nothing turns me on more than a big, roaring four-stroke twin. Don't think for a moment that I don't know the good outweighs the bad a thousand times over. All I'm saying is that once in a while it's nice to flick a switch, throw your bird into the wind, and you're flying. The key word is "simplicity," which brings us to a setup like the Cox* Canario.

The simplicity of electrics makes them naturals for the beginner. There are no tasks at hand save the important one, learning to fly! The Canario is an electric-powered glider that has a lightly loaded wing, is brightly colored, and builds in about one evening. I can't think of a combination more suited to the hassle-free needs of the newcomer.

THE KIT. The Canario comes with absolutely everything needed for a complete model except a two-channel radio. You'll find pushrods cut to length, epoxy, a reduction gear motor, a 450-mAh nickel-cadmium battery pack, a battery charger with timer that plugs into any car cigarette lighter, hardware, decals, and a very easy-to-read illustrated

SPECIFICATIONS

Type: *Sport Electric*
Span: *50 inches*
Area: *237.5 square inches*
Length: *30 inches*
Weight: *19¾ ounces*



The Cox Canario is a graceful, silent-flying model that is well suited for schoolyards.

instruction book which includes some preliminary flight instructions. If I've left anything out, don't worry, Cox hasn't.

The glider components are of molded foam that is pre-painted yellow, which serves as a nice background for the red stick-ons.

CONSTRUCTION. The wing halves are joined with epoxy—or Pacer's* Z-Foam Primer and Flex-Zap would be fast and light—and reinforcement tape is applied to the bottom. Incidentally, the airfoil is flat with molded-in wash-out in the tips, evidence that Cox has put some thought into this design. With the addition of a Cox Cadet two-channel radio and a female pilot, also included, the Canario was not only ready to go but balanced out exactly as specified. How simple!

FLYING. And now for the fun part. On the day of the test flight we were absolutely alone at the field. I made a radio check for range and function throws. At this point I stopped and hesitated. My intellect was saying, "You're ready to fly," but my conditioned routine was telling me I had left something out, like fueling up. This was a problem I'd have to adjust to.

I stood there dumbly, looking back and forth from Louis DeFrancesco, Dan Santich, and Alan Palermo, all from *M.A.N.*, for some sort of support. I finally got it, Louis barked the ultimatum, "Throw the switch or you're fired." That did it, I threw the switch and

All that is necessary for flying fun is shown in the photograph.

was ready to go, it was that simple.

I checked the engine nacelle one more time to make sure there was no needle-valve to adjust. I trotted off and gave the yellow glider a toss into the 5-10 mph wind. With a little down-trim the Canario climbed very well into the wind, gaining altitude at a better-than-expected rate. The dandelion yellow against the blue sky seemed a natural considering the beautiful spring day.

The Canario makes very graceful sweeping turns, the kind that won't get a beginner into a panic. Incidentally, I don't recommend flying the Canario in gusty wind conditions. The model is at home in a 0-5 mph breeze.

When the motor quits, you've got a lot of time for a bit more soaring before you set up for final. After touchdown, simply plug the removable battery into the charger, and the charger into the cigarette lighter, open your thermos of coffee, and relax a few minutes before the next flight. Doesn't sound very nerve-wracking, does it?

If you want to go to a lot or schoolyard that's a little closer than your "local" field 20 miles away, don't worry about attracting an army of bicycle-equipped kids from a 10-mile radius, because electrics are quiet!

So if you're a beginner looking for what's probably the most hassle-free entry into R/C, or if you're an old pro looking for a relaxing change of pace, then the Cox Canario is for you.

**The following are the addresses of the companies mentioned in this article:*

Cox Hobbies, Inc., 1525 E. Warner Ave., Santa Ana, CA 92705.

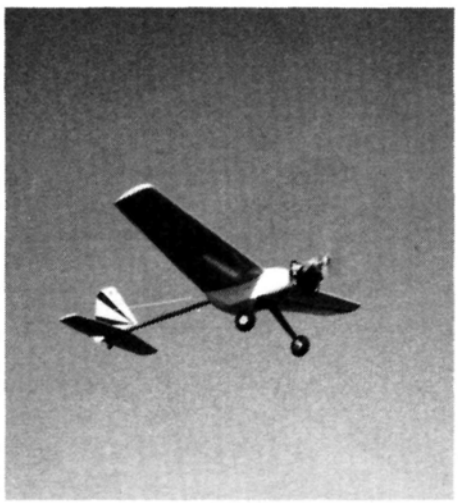
Pacer Technology & Resources, 1600 Dell Ave., Cambell, CA 95008. ■

Radio Control News

by ART SCHROEDER

THERE'S NO DOUBT in my mind that Byron Originals* has developed the answer to one of R/C modeling's long-standing questions: "In what do I test this new radio?" Most of us rely on an old clunker, frequently overweight from numerous repairs; some go ahead with their latest pride and joy, often with heartbreaking results. Neither approach is best. For testing equipment we've always needed a very low building time, good flying airplane that we could lose without breaking our pocketbooks or hearts; just such an airplane is found in Byron's latest release, Pipe Dream.

Pipe Dream takes a very simple concept to a satisfactory conclusion in a fine flying, relatively low cost, quick-to-assemble, rugged airplane with easily replaceable parts. In short, Pipe Dream is the perfect test bed for a variety of modeling needs—radio test, engine break-in, maneuver practice, and plain, personal "rust" removal. I was really happy to have it this spring to remove the winter-induced "rust" in these old fingers. And, because it's big and can use large gasoline engines, it subjects radios to the same stresses and vibration they'll find in our fancier birds.



Ideal for testing equipment, Byron's new kit also happens to be a good flyer and excellent as a trainer.

Along with all this, the airplane makes a fine trainer in its rudder version (it can be built for rudder or aileron) with high dihedral setting (dihedral and CG are adjustable). Its flight qualities are very soft and its rugged airframe will absorb most indignities thrown at it. These advantages make it a perfect sport, knock-around, fun-fly bird. Pipe Dream has something for everyone.

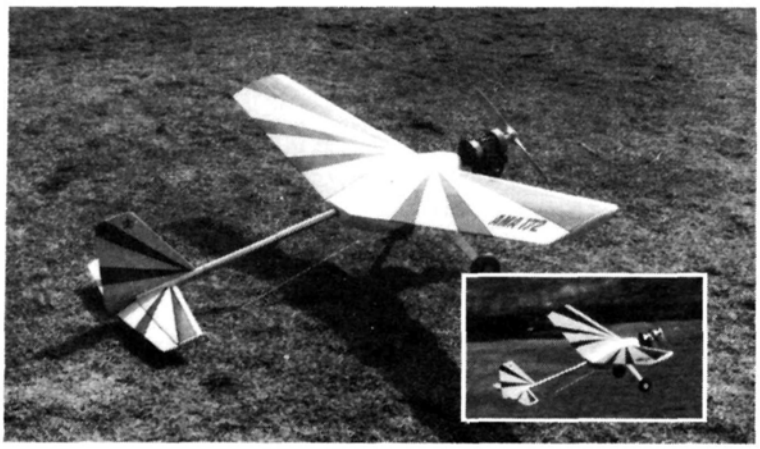
But its biggest charm is its quick assembly. If you spend more than a couple of nights on this one, you're doing more sleeping than working. Even a first-time modeler can put this one together with few problems. Pipe Dream has a fuselage that is nothing more than a 1-inch aluminum pipe, 48 inches long. The familiar Byron bolt-on, flat mount attaches to the front of the pipe. Econo-Koted foam wings plug into aluminum brackets that are attached to the pipe and the same brackets provide attachment for the landing gear, radio tray, and plastic equipment pod. A foam stabilizer is epoxied to the rear of the pipe and a balsa fin and rudder finish off the job. With so little time invested and the capability for replacement of any damaged parts, you need not worry as you would when testing equipment in that 400-hour beauty.

Pipe Dream is a big airplane (58 inches long with an 83-inch wingspan) that clearly fits today's trend toward "giant" aircraft. It's flyable with a range of engines from .60 two-cycle to 2 and 3 cid chainsaw units. It can be flown with rudder or aileron (dihedral reduced) with elevator, engine throttle, and even flaps if you so desire.

At first glance, you might feel the bird is short on looks—I think its absolutely functional look is kind of neat—but, after a while, it begins to look a lot like today's ultra-lights. Indeed, with a ¼-scale pilot sticking out of the pod you might convince your friends that this is a scale job. Then again, you might not!

The newest Byron bird fills a definite need for giant-airplane fans. It may have been someone's Pipe Dream but it's now a reality and I highly recommend that you give it a try. After many flight hours, I can say I've had more fun with this one than most birds I've done in the past few years. A full Field & Bench Review will follow soon.

(Continued on page 126)



Pipe Dream is simplicity with wings.

The Swift Wins the Day!

article and photos by BUDD DAVISSON

THE aircraft industry made a lot of serious screw-ups in 1946. The biggest was that they expected all those returning wartime throttle jockeys to want an airplane. The airplane-in-every-garage mentality prevailed and every airplane plant in the country retooled their wartime production line for one kind of civilian bird or another and kept right on cranking.

Pretty soon the country was up to its armpits in little airplanes of all descriptions. An amazing 35,000 airplanes were built in 1946 alone. In 1948 only 2,500 were built! That tells you something, doesn't it?

But, every screw-up benefits somebody sooner or later and if the folks at Globe Aircraft had known what the future held in store they might not have built Swifts at such a frantic rate. Or at all. And that would have been a real disaster for us 40 years after the fact! Today, the little Swift is still one of the best looking and most popular two-place airplanes in existence. A lot of flying folks would be mighty frustrated if it had never been, because the Swift has the kind of looks and flying characteristics that scratch the "itch" so common to performance-oriented pilots.

I suppose right now I should launch into a tedious rendering of the history of the airplane, but somehow I can't. I can't because the Swift is one airplane that demands more than words and statistics. This is one airplane that demands that each and every person who thinks they know airplanes should saddle-up, at least once. The rest should listen to fools like me rant on about how that glorious little sucker feels when you crank in a little aileron and watch the world rotate about your spinner.

First, you should realize that there are Swifts and then there are *Swifts*. Unfortunately, to do that we'll have to dig into just a little of the airplane's past. For instance, the original Swift, the GC-1, was a pre-war design using molded plywood. That was changed to metal in the GC-1A before the bird went into production. You have to know the GC-1A designation because the "A" means the airplane left the factory with a C-85 Continental in the nose. Less than a dozen GC-1As are still flying and only a couple of them still have the C-85 installed. Reason? With only 85 horses pumping away on a hot day and with two lard-butts on board, the trees at the end of the runway get real tall, real fast. It flew okay when light and in cool, fat air but that was it.

The obvious fix was more power, which arrived in the form of a six-cylinder, 125-horse Continental that changed the airplane's designation to GC-1B and eliminated the

(free poster pages 66 and 67; text continued on page 69)

Modified for aerobatics, this Swift handles like a fighter.


C-80760

GC-1A

photo by Budd Davisson

Swift in Khakis: The T-35 Buckaroo

by BUDD DAVISSON

The Temco Buckaroo was intended for military purposes but lost out to the Beechcraft T-34. Only 13 were built. photo by BUDD DAVISSON

FROM 1949 to 1951 the military decided to replace their trusty T-6s, Stearmans, etc., with something more modern, so they issued a bid specification for a new primary trainer. One of those who responded was Temco.

Temco's entry in the race for a new trainer was the Buckaroo. Originally, they modified a stock Swift into tandem seating with a sliding bubble canopy. However, when the original 1949 contract session was scrapped (the Fairchild T-31 had won, but was never produced), they took the time to design an airplane that used the Swift as a basis, but diverged wildly in almost all mechanical directions.

The new airplane, now dubbed T-35, was a gorgeous little machine powered by a 165-hp Franklin. It seated its two pilots in a tandem cockpit arrangement that was commodious, but soul-fitting at the same time. The USAF bought three of the airplanes to evaluate. Unfortunately, the military didn't see any tail-dragger fighters in its future so they opted for the tricycle-geared Beech T-34 Mentor instead of the Buckaroo.

Saudi Arabia was also looking for a trainer and they anted up for ten armed versions of the Buckaroo that carried the designation T-34A.

Considering that the total production of Buckaroos was only 13, plus the original prototype, it has survived well because the prototype and three production Buckaroos still exist.

The Buckaroo flies even better than it looks. It's a Swift gone to heaven and that's the reason why so many have survived. That's also the reason most Swift pilots would kill to own one—or even more difficult, they would deal the Saudi government out of the remains that were left of their ten airplanes.

It's difficult to imagine the conversations between a down-home Tennessee boy like Swift Association president Charlie Nelson and an Arabian airforce general, but whatever was said worked. The actual story of how Nelson and the Swift Association came to inherit all Arabian Buckaroo pieces is worthy of a book. Nelson and all the guys who helped get the airplanes home, and one flying, deserve medals.

The Swift Association has a mini-museum at their headquarters in Athens, Tennessee, and it's well worth the visit. Their address is McMinn County Airport, Hangar No. 2, Athens, TN 37303. ■

The Swift is an aerial Deuce Coupe; a flying '32 Ford.

from page 65)

pucker factor associated with takeoffs.

Just for the record, in 1946 Globe built 428 GC-1As and 504 GC-1Bs and Texas Engineering and Manufacturing Company (Temco) built an additional 329 under license. It took five years for them to sell that many airplanes, at which time Temco built an additional 260 "B" models.

This is an airplane that makes you smile, whether you fly it or not. It's just plain cute, with maybe a little pugnaciousness suggested by its jaunty tail-down stance. You walk and you grin because you know that here is an airplane that's going to fly as good as it looks.

But not everybody is satisfied with its looks—or its performance. In fact, the Swift is an aerial Deuce Coupe; a flying '32 Ford that is almost always molded by the caring hand of the restorer or the ready-to-rock wrench of the hot-rodder.

The original Globe Swift had slotted wings and a Continental C-85 engine with retractable landing gear.

The Swift is the basis for dreams. If you can dream it and you can afford it, you can make the Swift do it.

Right now there are two distinct schools of thought on the Swift—the purists and the customizers. In any other field of endeavor, each of these groups would look at the other as though they were deviates. The purists would accuse the modifiers of raping and pillaging a fine breed and the rodders would accuse the purists of wearing pink underwear and flowers behind their ears. Not so the Swiftites. The co-exist handsomely and, in fact, form the steel-solid backbone of the Swift Association of America.

The restored Swifts are hard to miss. For one thing, factory stock Swifts were all polished aluminum with blue stripes. But, no factory Swift ever looked like today's restored models. We're talking serious polishing here, the kind that gives spectators third-degree burns from 30 paces.

The hot-rod Swifts are hard to categorize because each one is different. The engine will have been replaced by anything from a 150-horse Lycoming to a 250-horse, turbo-charged Franklin. The wings may have their rounded tips replaced by rakish, squared Bonanza tips, extended T-35 Buckaroo tips, or dummy tip tanks. The cockpit system will include a formed windshield and any variation of canopy entry system, ranging from gull-wing doors to a full-blown bubble that rolls back for entry. They have been chopped and channeled, bored and stroked, and nosed and decked until they are exactly what their owners want. And you almost never see two the same.

But you have to step over the fuselage sides and slide down into that diminutive cabin to understand what really makes the airplane so loved. For one thing, it fits just right and, its feet-out-in-front-of-you seating position is apt to remind you of early MGs or Triumphs, or, depending on where your head is at, a '57 'Vette.

The original panel is a pleasing combination of early-spigot design with a touch of Wurlitzer in its ribbed plastic lower panel that mounts a bunch of funky looking switches. Incidentally, the spigot in question is the gear selector. Perhaps the only thing out of place, at least to the aerial street rodders, is the pair of control wheels. The rodders cure that by replacing them with fighter-type control sticks to go with the airplane's mini-fighter image.

In certain circles, like those populated by insurance agents, the Swift's ground handling has a less-than-wholesome reputation. In fact, there are legions of scare stories about how easy she is to ground loop and how hard she is to land. True, yet untrue. With her short tail, you'd have to expect to stay on your toes, at least a little bit. And with her gear down and flaps extended, you couldn't expect her to be a Cub. And she isn't. And that's one of the reasons she's so loved.

Flown right, the Swift is a medium-demand airplane. On takeoff, for instance, if you have a hard left crosswind, you'll have to know to be prepared to use some right brake during takeoff because full right rudder may not be enough to keep her straight. However, if you never encountered a left crosswind of sufficient intensity, you'd think the Swift was one of the easier airplanes to takeoff. When you push the nose down, you have tremendous visibility and only the slightest pressure on the rudder is needed to keep her from wandering.

With the 125-hp Continental, she doesn't exactly rip into the sky like the fighter she strives to emulate, but her climb increases dramatically with the bigger engine mods. With the 250-hp Franklin, she is running upstairs while

(Continued on page 117)

Cox Hobbies Turbo Scorpion

photos by Mike Lee

IT'S OFTEN been said that competition breeds thoroughbreds. Nowhere has this saying been more true than in car racing. A steady and skillful driver can do much to make a car win, but when the driving skills among the drivers is about even, then it becomes a race with the cars themselves. The best cars will be the victors.

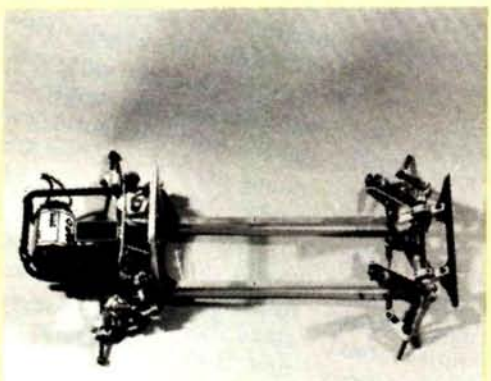
This Road & Bench Review deals with a fine example of thoroughbred development from a vehicle that has become a legend in its own time, the Cox Hobbies* Turbo Scorpion. The Turbo Scorpion is a direct descendent of the famous Scorpion that was the scourge of the West. At one time, you could go to any West Coast track and find a stampede of Scorpions in the pits ready to duel. And if you didn't have one, most drivers would tell you that you had already lost the race!

THE KIT. Because the Turbo Scorpion is a refinement of the breed, let's see just what has been improved to make it a new contender. The body has a new design, with sleeker lines and more pleasing contours—but looks aren't everything. Under the hood is a differential-equipped transmission for better power transfer to the wheels. The suspension has been improved with over-size oil dampeners and the front end sports new trailing arms with adjustable camber levers. The gearing has been updated for higher speeds, and the speed controller is now a full three-speed forward with reverse unit. Even the tires have been

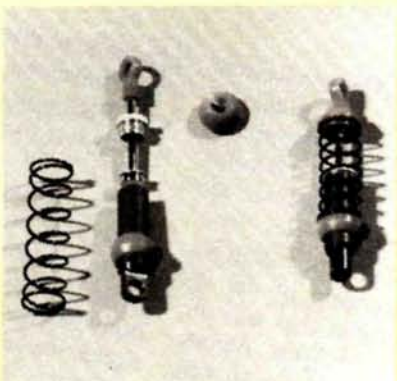
changed to assist in the maximum traction effect on dirt. The Turbo Scorpion seems ready to take on some serious competition right out of the box.

The Turbo Scorpion is designed to meet the qualifications of several ROAR- and ORCCA-sanctioned classes, most common of which are the Production, Stock two-wheel-drive and Modified two-wheel-drive. The car is set-up to handle any standard 05 class motor and a six-cell battery pack. With modifications to the basic car, a seven-cell pack will fit. The Scorpion will accept almost any two-channel radio system using medium- to small-size servos, and there is room for a 500-mAh battery for the radio.

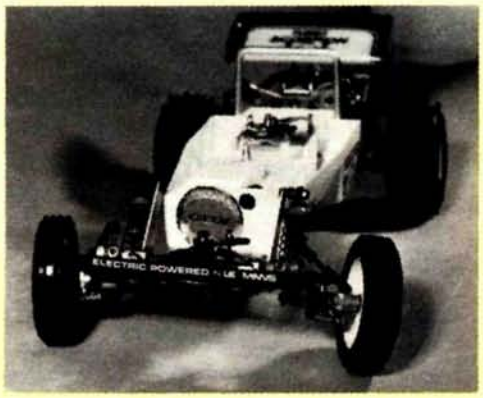
The Turbo Scorpion is 15.75 inches long and 8.85 inches wide. The wheel-base is 10.25 inches with a ground clearance at rest of 1.18 inches.



Chassis with rear cage and front suspension towers. Car is halfway complete and looking good.



A look at the over-size oil-filled dampeners with coil-overs as supplied. Very effective dampening achieved, an improvement over the previous Scorpion.



Front-end view of Turbo Scorpion. Clean lines and adjustable front-end geometry are effective.

The front wheel track is 7.15 inches and the rear is 7.32 inches. The overall weight is about 2½ pounds, ready to run. Power is supplied by a 6-cell battery pack and a standard four-cell pack for the radio to operate on.

CONSTRUCTION. Assembly begins with the transmission, which is housed in a die-cast aluminum case, already assembled internally. The transmission gears include the new differential not found on earlier model Scorpions, which is in itself a quantum leap in the car's competitive edge. A Mabuchi RS-540 motor is also in place on the transmission, with high-speed gears mounted. Low-speed gears are included in the kit. The motor is fixed in its mount, which provides just the right gear mesh. No adjustment can be made, although the mounting holes can be reamed out to allow adjustment later on. The external gears are housed under a protective plastic cover, and this must be in place at all times, lest you want the center gear to drop out. Round out the assembly by attaching the rear shock towers.

At the front end is the familiar square rail frame mated to the front suspension. On the front there is the front spindle, servo saver mount/bash plate, and shock towers. Notable here are the instructions, which not only tell you what nuts, screws, and bolts to use, but are illustrated as well. Simply comparing the real thing to the illustration will confirm the right parts.

The front servo saver assembly is a spring-loaded affair, and seems quite adequate for the job. The front spindle is tempered steel and can be used to adjust the caster of the front geometry. All connecting ends are serviced with oversize ball joints for much stronger joints.

At the rear is the rear chassis plate and suspension plates. Mounting these to the rail frame creates one very rigid chassis which is straight and true. Place the transmission assembly on the chassis, and it starts to look like a car.

The rear chassis cage is next, which is a plastic assembly. It's held to the chassis with self-tapping screws, and is strong enough to resist hard knocks. Don't leave this out, because the upper body cage attaches to it.

The oil-filled dampeners come already assembled but have no oil in them. The kit includes a generous supply of shock oil, plus end seals with which to service the dampeners. I anticipated using the Turbo Scorpion on a very tough local track, so I elected to use a heavier oil than that which was supplied. This, of course, is the mechanic's preference. Spring coil-overs are also provided in the kit, and these are functional as they hold up the entire car. The spring retainers are adjustable, allowing varying spring rates. Action from the dampeners was judged as very good, with progressive dampening in both directions.

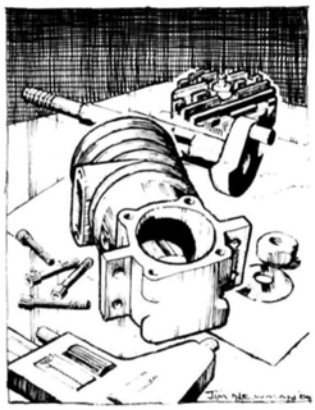
Assemble and mount the rear suspension arms, which are the A-frame type and are made of cast aluminum. Oilite type bushings are already installed in the arms for the axles to ride in and are easily replaceable with optional ball bearings. The arms are held to the chassis by hardened pins at the rear chassis plate. Make sure the dog-bone axles are inserted first before final assembly.

Assemble and place the front suspension arms. Again, there are cast aluminum A-arms trailing from the spindles. The front end features castor locks for fast adjustment of the castor geometry, and a simple setscrew arrangement is provided. The shocks are mounted on the front and rear by polished ball joints to allow the suspension arms absolute freedom of movement. Place the tie-rods, followed by the front bumper and control links. For the most part, this finishes the front end.

Now install the aluminum roll bar at the rear. From here on out, it's all downhill. Mount the radio tub to the frame and attach it with machined screws in the chassis. The tub features a water-resistant control rod guide for the steering rod, and is really a thoughtful idea. Inside the tub, place the new three-speed throttle, which can be modified to have four speeds. You can also have reverse speed, and dynamic brakes are built-in. Believe me, you don't want to leave the brakes out of an off-road car.

Mount the motor battery to the bottom of the tub inside a large covered cavity. The wires from the speed controller poke through the tub via two highly conductive bolts. A two-wire harness hangs out the bottom to connect to the six-cell battery, and they have even made a small cubby hole in which to

(Continued on page 82)



About Those Engi

by JOE WAGNER

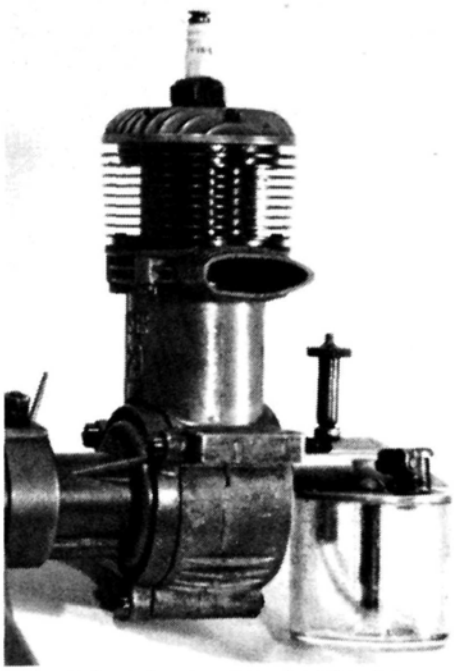
QUESTIONS about old-time engines continue to come in. This isn't surprising; interest in spark ignition motors has reached a very high point. There are no less than *thirty* types of them being reproduced today! From the Atom .097 to the Forster .99, just about every style and size of old-timer model engine can now be obtained.

For the "antique" lovers there are motors such as the Brown Junior .60, the Megow .19, and the Ohlsson Gold Seal .57. Fans of the 1940s era can get Super Cyclone .60s, Bantam .19s, and Torpedo .29s. Lovers of racing types can now buy replicas of Edco Sky Devil .60s and McCoy Redhead .29s. (So far, no one has attempted to duplicate Ohlsson .19s, .23s, or .60s, but word could come at any time that even these difficult-to-reproduce model motors are once again on the market.)

Most of the modern reproduction engines are of excellent quality. In fact, some are significantly better than the originals! For example, the first Torpedo .29 engines were quite fragile, with thin-walled magnesium castings. Even after K&B took over the manufacture of this Bill Atwood design in 1946, and changed to aluminum castings, the Torpedo was still easy to damage in a crash. But the newly-reproduced Torpedo .29 and .32 engines being made by Larry Jenno have investment castings of a dense, high-strength aluminum alloy. What's more, these new Torpedoes noticeably outperform their 1946 K&B predecessors.

Another good example is the Orwick .64. Three separate companies are now reproducing this classic engine of the 1940s. The only ones I've seen myself are the British-made Dunham Orwicks. They look exactly like the old-time originals, but are much smoother-running.

The engines made personally by Henry Orwick were powerful and reliable, but they vibrated a lot. Model airplane kits designed for the big green Orwicks, such as J.C. Yates' Madman and Bob Palmer's Go-Devil, had molded plywood firewalls that extended 1½ inches back into the fuselage sides to absorb the Orwick's vibration and keep it from shaking the airplane apart. But the Dunham replicas of the Orwick run as smoothly as any .60 engine I've ever operated.



An original Forster .29 of 1946 vintage. Author's personal favorite of class B engines in spite of its peculiarly-threaded head fasteners.

On the other hand, there are some drawbacks to these present-day "old timers." For one thing, all of them are being made in very small quantities. This results in high prices. At Christmastime in 1946, a Bantam sold for $18.50, and the Orwick cost $32.50. Today's prices for their replicas are much, much higher, even allowing for the effects of inflation. Newly-made Bantams go for $175, and the Orwicks cost around $200 apiece. Besides, all the old-time engines came complete with spark plugs and most included coils and condensers as well. Today hardly any reproduction motors are equipped with spark plugs when you get them. It's now up to the buyer to find his own sources of ignition components, and they are far from inexpensive.

Another point: most of the sparker replicas are being made in one- or two-man workshops. Because this is a very time-consuming job, the reproduction makers have little time to spare for things such as answering mail. I've written to eleven replica manufacturers, asking for specific information about their products. Only four have replied.

The majority of old engine reproductions are sold to collectors, or to modelers who just want a memento of the "good old days." Only a few of these motors will actually be flown in airplanes. Maybe this is why hardly any replica makers seem to offer replacement parts for their products and the few who do sell parts, price them high. A while ago I wanted to buy three minor castings for a certain well-known old-time engine from a replica manufacturer. The price he quoted me for the three parts was only $20 less than he was asking for a complete engine!

Another disadvantage of reproduction motors deserves mentioning. This is that many of their parts are slightly different from those of the original engines, making interchangeability impossible. Not all replica makers do this. Of those that do, some say that it's to prevent "counterfeiting"; doctoring up a newly-made motor to look like a rare and more valuable original. They have a point. This sort of thing has been a pain to gun collectors for many years. However, I personally believe that the main reason for altering the design of old engines is to compel modelers to buy spare parts from one source alone: the replica maker.

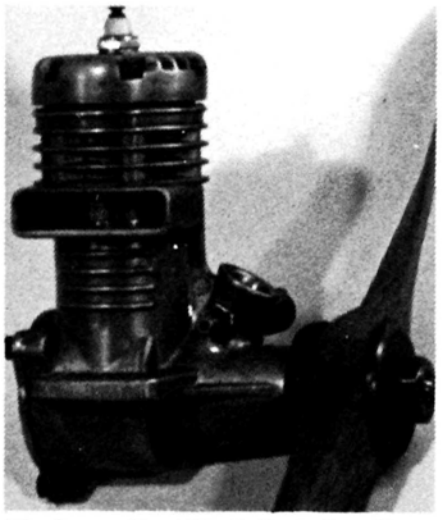
The use of special, non-interchangeable parts, though, has been around for a long time in the model engine game. For instance, Ray Arden's engine designs contained absolutely no "standard hardware" at all. Perhaps a better example is the Forster .29. Its screws and nuts

looked like standard parts, but they were far from it. Forster used special threads on their fasteners, such as 4-36 where a standard 4-40 would have done just as well. If you broke or lost a screw or nut from your Forster .29, it could only be replaced by a "genuine factory part." That made for increased business—and profits—for the Forster brothers. But it surely didn't benefit us model fliers.

Some of the inquiries I've been getting from readers show that there are still modelers who want to use old-time spark ignition motors in airplanes. Thus, it might be a good idea to talk about a quirk of these sparkers that can be deadly dangerous: their incendiary tendency.

Gasoline is extremely inflammable, as nearly everyone knows, yet lots of modelers seem to forget this basic fact when they're trying to start a balky spark ignition engine. Consider an Ohlsson .60-powered model, such as a Vagabond. The engine's fuel tank, attached just under its intake tube, is normally filled with a squirt-type oil can. It's almost impossible to keep some fuel from escaping through the vent hole and seeping around the model's nose section. Then, when you choke the motor a couple of times and flip the prop with the timer retarded, it's not uncommon for a "bloop" of bluish flame to erupt from the exhaust stack. Too often this will ignite the spilled gasoline behind the engine.

Available once again, the 1940 Super Cyclone .60 in single-plug form. Was also available with a dual spark plug head.



The famous Fox .35 in U-Control configuration. In continuous production for many years.

Some early engines had configurations that just about guaranteed external fires. The Bunch Mighty Midget and the Brown Junior, for instance, had exhaust ports that were merely a series of holes in their cylinders, directly in front of and above their rear intake tubes. Backfires could pass directly over the fuel tanks! I know of many models that were incinerated because of this. The nitrate dope we used in the 1940s was nearly as inflammable, even bone dry, as gasoline. It only took a couple of seconds for a flame in the engine area to set the entire model alight. That's why few of the old-time "gas models" had cowled-in engines. Leaving the motor out in the breeze not only reduced the possibility of spilled fuel accumulating, but it also gave a modeler a chance to blow out an engine fire before it burned up the whole airplane.

Engine-caused fire is just as much of a hazard with spark ignition engines today, if you use gas-and-oil fuel. Gas ignites as easily now as it did in 1940, and I've seen several modern "old-timer" models burned up by motor backfires. Alcohol-and-castor fuel is far less dangerous. If you aren't flying in Society of Antique Modelers competition (where gas-and-oil is required), FAI-type glow fuel is the best way to go. It runs cooler, castor oil is

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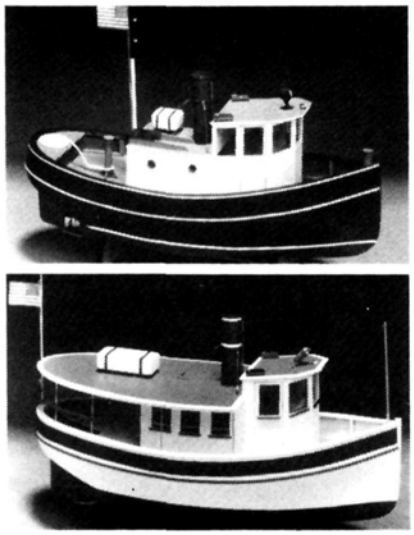
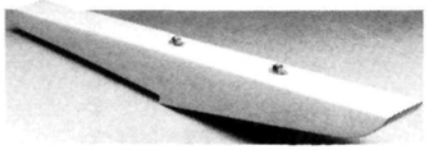
Product News



STEAM POWERED BOATS

Enter the world of live steam power in wooden model boats. Midwest Products (400 S. Indiana St., P.O. Box 564, Hobart, IN 46342) announces the release of two new wooden boat models designed especially for their Model VI Steam Engine—The Tour Master and The Harbor Master. The Tour Master is a model of a typical touring steam boat seen in use around the turn of the century. The Harbor Master is an example of a "character" tug yacht seen in use today. Both models are designed to be fun and easy to build with machined and die-cut parts for rapid assembly. The kits include step-by-step instruction booklets; clear, full-size plans; and cast metal finishing details to create realistic replicas.



DELUXE FLOAT KIT

Granite State R/C Products (405 Main St., Nashua, NH 03060) has introduced new 31-inch Deluxe Floats for models from 4 to 8 pounds. The floats combine excellent performance with ease of building. The kit contains two foam cores and all the necessary balsa sheeting, plywood, and hardware to complete the floats. They are available from local hobby dealers, mail order houses, or directly from Granite State.

NEW HEATHKIT CATALOG

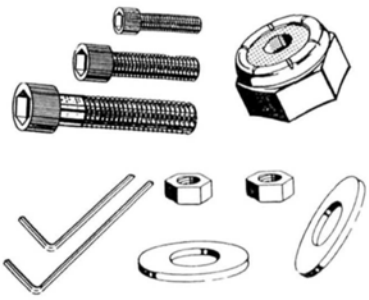
The new Heathkit catalog highlights automation training and showcases a wide variety of kit and assembled products. The HERO 2000 is a new robotics/automation trainer designed for teaching the principles of intelligent machines and the electronics required to create them. The catalog features over 400 electronic products. To receive this free catalog, write to the Heath Company (Dept. 150-775, Benton Harbor, MI 49022, USA; in Canada, 1020 Islington Ave., Dept. 3100, Toronto, Ontario M8Z 5Z3).

COX BANDIDO

A totally new 1/10-scale R/C entry-level off-road racer, the Cox (1525 E. Warner Ave., Santa Ana, CA 92705) Bandido features easy assembly with fully-illustrated step-by-step instructions; a one-piece rugged box chassis; a powerful Mabuchi 540S motor fitted to a gear-type differential; a wire-wound speed controller for a full range of speeds; lightweight, three-piece racing wheels, and special rubber tires. The Bandido comes with everything required for assembly except battery, charger, and radio system. Cox recommends their 9086 Battery Pack, 9087 Quick Charger, and 8220 Cadet Radio to complement the Bandido.

DREMEL MOTO-TOOLS

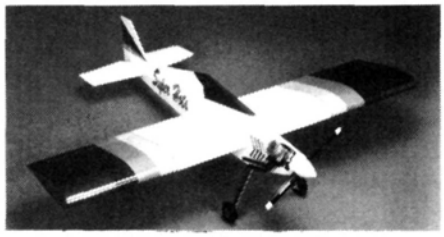
Dremel (4915 21st St., Racine, WI 53406-9989) introduces a new Moto-Tool line featuring tools that are compact and lightweight with a new easy-to-use design and 30% more power. The Moto-Tool has been improved with the addition of keyless chuck capability for use with bits up to 1/8 inch and a tapered housing shape for comfortable finger-tip control. Dremel offers three different Moto-Tools: a variable-speed, a two-speed, and a single-speed model. All have increased power and can cut hardened steel and engraving glass, as well as wood, plastic, ceramic tile, and all kinds of metals.



NEW DU-BRO HARDWARE

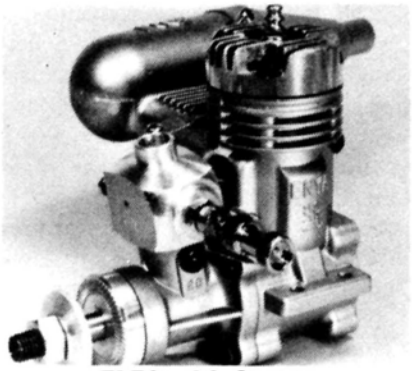
Du-Bro Products (480 Bonner Rd., Wauconda, IL 60084) announces their new line of hardware and accessories for the R/C car modeler. The first to be released is a line of metric screws, nuts, and washers, including nylon insert lock nuts, hex nuts, flat washers, socket-head cap screws, and metric hex wrenches. See your local dealer for these new products from Du-Bro.

Descriptions of new products appearing in these pages were derived from press releases supplied by the manufacturers and or their advertising agencies. The information given here does not constitute endorsement by **Model Airplane News,** or guarantee of performance or safety by **M.A.N.** When writing to the manufacturer about any product described here, be sure to mention you read about it in **Model Airplane News.**



MIDWEST SUPER HOTS

Midwest Products (400 S. Indiana St., P.O. Box 564, Hobart, IN 46342) announces the Super Hots. Designed from the contest-winning .40-size Hots, Midwest's Super Hots is bigger and better to give optimum performance in a .60-size airplane. The Super Hots has a 54-inch wingspan, a 702-square-inch wing area, is 5 to 7 pounds, and requires a .40 to .65 engine and a four-channel radio. Midwest's Micro-Cut Quality machined and cleanly die-cut parts eliminate the need to scratch-build.



ENYA SS 25 BB

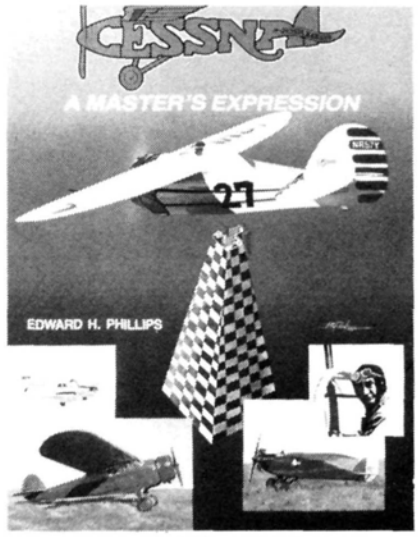
The Enya SS 25 BB is part of one of the best all-around engine lineups in the world—the Enya Super Sport Series. The SS 25 BB was created to power .25-size aircraft at a price you can afford. Distributed by Altech Marketing (P.O. Box 286, Fords, NJ 08863), this Schnuerle ported .25 cubic inch engine features two ball bearings supporting the crankshaft for low friction running and higher rpm up to 16,000. The Enya secret is the cast-iron piston riding in a nitrogen gas-hardened steel cylinder for outstandingly easy starting, break-in, and long term use. Specifications are: bore x stroke, .70x.645 inch; displacement, .249 cubic inch; weight, 8.04 ounces; horsepower, .73; and rpm range, 2,500 to 16,000.

TECHNISPORT AW-75R

The Acoms Technisport AW-75R is one of the most refined wheel/pistol grip radios available. Altech Marketing (P.O. Box 286, Fords, NJ 08863) and Acoms have designed this radio to be easy-to-use with many features, including servo reversing, mandatory ratchet trims, a steering dual rate thumbwheel, servo end travel adjustment, and a grip reverse for left-handers. The receiver is easy to install and is well sealed to prevent the intrusion of water and dirt. The servos have stronger gears so this system can be used in cars, boats, or any vehicle.

ROBBE WINDY

Windy is a truly simple and attractive airplane for the beginner. All critical components have been designed to fit properly without any complicated alignment procedures. The rigid construction of the wings and fuselage greatly reduce the chance of damage during training flights. Everything needed to build and finish Windy is included in the kit and it uses a .09 two-stroke, a .19-.21 four-stroke, or a .05 electric engine. Wingspan is 86½ inches, length is 43 inches, wing area is 596 square inches, weight is 63 ounces, and wing loading is 15½ ounces per square foot. This kit is available from Robbe (180 Township Line Rd., Belle Mead, NJ 08502).



ALL ABOUT CESSNA

The history of Clyde Cessna and the Cessna Aircraft Company beginning with the 1911 Bleriot replica Queen monoplane is available in this 152-page book by Edward H. Phillips. *Cessna, A Master's Expression* outlines the early cabin series, the AWs and DC-6s, the racing planes, the classic Airmasters, and popular 120/140s, 170s, and 190/195 series. There are over 215 photos, 5 three-view drawings, complete specs on all models, and a lot of insight and previously unpublished data. Available from Historic Aviation (3850M Coronation Rd., Eagan, MI 55122), this book is $24.95. Credit card orders only call toll-free: 1-800-225-5575; from Minnesota, Alaska, Hawaii, and foreign countries call 1-612-454-2493.

AFTA-MUFFLER

The Afta-Muffler from Granite State R/C Products (405 Main St., Nashua, NH 03060) reduces the noise level of almost any muffler on the market today. It doesn't replace your existing muffler, but attaches to it using Granite State's silicone tubing (#252) and adjustable tuned pipe clamp (#253).

R&B: SCORPION

(Continued from page 75)

stick the connector and get it out of the way of the battery when mounted. A large plastic cover slides into the bottom to hold the battery in place. It can be removed within seconds to allow quick access to the battery.

Well, guess what? You now have an assembled car. You only need to mount the radio equipment and paint the body. Small bays are molded into the tub for the servos and there is plenty of room left to place the receiver and radio battery.

Painting the body is simple, with no trimming necessary. All mounting holes are already there, making for a perfect fit. I painted my Turbo Scorpion with acrylic lacquer and dressed it up with the supplied sponsor stickers. The body is made of clear plastic polycarbonate and should last a long time.

Once the body is dressed up, mount the upper roll cage with two self-tapping screws. I recommend using washers between the screws and the body to prevent the screws from punching through the body later on. Mounting the body to the chassis requires only one body pin and four snaps.

Mounting the rear aerodynamic wing is the *coup de grace* and its deflection angle is fully adjustable. Once it's in place, you can stand back and admire your handiwork. The Turbo Scorpion really is a nice looking car. The front tires are quadruple-ribbed rubber on lightweight plastic rims, and the rear tires are wide track spiked tires. The rear tires are not heavily populated with spikes and are probably more suited to run in loose sand. Obviously you wouldn't want to run these on hard pavement because the spikes would disappear real fast!

The Turbo Scorpion has decorative headlights, a driver figure molded into the body, aircraft locking nuts in critical areas, and a nice rear-mounted antenna. In all, the Turbo Scorpion goes together well and it took me only two nights to assemble and get running. The next thing I had to do was to run her and see what kind of guts the Turbo Scorpion had.

PERFORMANCE. At the track, I found the Turbo Scorpion to be much faster out of the box than its earlier brother. The handling of the Turbo Scorpion was very good due to the much-improved suspension and oversize shocks. Dampening was rated excellent with the heavy oil, which I recommend, in the dampeners.

(Continued on page 91)

SPECIFICATIONS

Type: *Sport Trainer*
Wingspan: *49.8 inches*
Wing Area: *455 square inches*
Length: *35.5 inches*
Weight: *40 ounces*
Engine: *.05-.15 two-stroke, .20-.21 four-stroke*
Electric: *05*
Channels: *2, 3, or 4*

Robbe

TF-1 Parat

For gas or electric, a thrilling experience.

THE FIRST MODEL airplane I built was the TD Coupe from a 1936 issue of *Model Airplane News,* so I was pleased when I was asked to do a *M.A.N.* Field & Bench Review. I was even more pleased when the Robbe* TF 1 Parat arrived.

THE KIT. The kit includes almost all of the items needed to complete the construction and the quality of the materials is excellent. The plans are quite clear, with complete multi-lingual instructions with lots of photos.

CONSTRUCTION. The wing was the first item I chose to construct and I found it to be very easy since it's a foam core with veneer covering. All I had to do was add the leading edges and the wing tips, and join the two halves together. I used white glue for this and reinforced the center section with the glass cloth furnished in the kit. When this dried I sanded the leading edges and tips to shape and, with the exception of the covering, the wing was

by VICTOR WENDT

Parat is a splendid candidate for electric power. Only simple modifications are necessary.

complete. For the electric version, a built-up wing kit is optional.

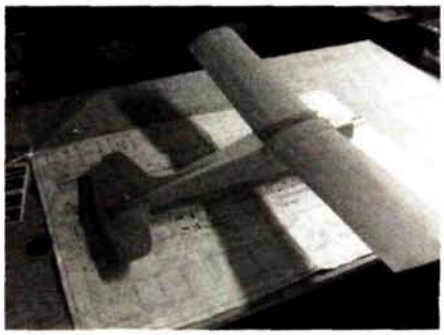
The fuselage was next and I found that construction was just as straightforward as in the wing. I began by building the fuselage sides. The entire outer edges are reinforced with 3/16-inch square balsa sticks to give it the required strength. I used Satellite City* Hot Stuff and retarder to speed construction.

The next step was to assemble the fuselage bottom, which was cut from #34 balsa and assembled over the bottom view of the plans. Next I glued bulkheads #36 and #35 to each end of the fuselage floor, and I was ready to glue the fuselage sides to the floor. I ensured that all bulkheads were square. Once this had been accomplished, I added the additional bulkheads to the fuselage as well as the motor mounts in their respective places. Note: When installing the motor mounts, ensure that you place the 2° offset that is required for the engine.

Before I attached the top and bottom covering to the fuselage, I installed the control rods. I chose to use the tube type and this, of course, required that I anchor it at both ends prior to closing in the fuselage. At this point I installed the plywood landing gear blocks into the fuselage. I used 5-minute epoxy to ensure a secure mount that would handle the stress that is placed on the landing gear. I attached the landing gear itself after the aircraft was covered and I attached it with nylon straps and screws.

Next I installed the engine. I chose an O.S. Max .20 four-cycle from Great Planes Model Distributors*. I've become fascinated with four-cycle engines and I have a .45 and .60. I fit the engine to the mount and drilled the

(Continued on page 106)



The kit is well-engineered and assembly is straightforward.

A removable hatch is built for access to fuel compartment for gas or batteries for electric.

Plans are complemented by a complete construction booklet.

R&B: SCORPION

(Continued from page 82)

The added differential inside the Turbo Scorpion was well appreciated in the rough, allowing easy power slides without spin-outs. The updated tires worked very well, providing positive cornering ability with a minimum of tire burning from the rears.

Of course, the real acid test for any new car is putting it into an actual race. It just so happened that the local race club was holding one a few days after I completed this car. I entered the Turbo Scorpion in the two-wheel-drive Stock class and found a gob of cars already entered.

Well, the Turbo Scorpion was definitely competitive! She handled the track conditions with ease, making jumps nicely and landing on all fours to continue on. If not for the numb thumbs of the driver (they don't call me the Kamikaze for nothing), the Turbo Scorpion would have easily placed in the finals. She is that good a car!

There you have it, the car that was made a lot better by thoroughbred breeding. The Cox Turbo Scorpion has improved in handling, speed, and looks. The improvements are well worth the bother, and could make the Turbo Scorpion the Western scourge once again. If you're looking for a good pedigree car, look to the Cox Turbo Scorpion. It's an improved breed of car.

**The following is the address of the company mentioned in this article:*

Cox Hobbies, Inc., 1525 E. Warner Ave., Santa Ana, CA 92705. ■

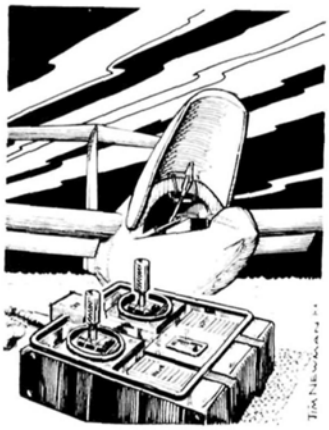
O.S. FF-240

(Continued from page 22)

Pegasus has (also including gaskets and screws) around three hundred and seventy.

Incidentally, for the record (and since Mr. Editor Dan Santich mentioned Bill Brown's adoption of the .60 cu in. size in his article "Big Engine Shoot-Out" in the April issue) it is worth pointing out that Bill's first choice was not a .60 at all. It is not generally known that the engine that started it all was much smaller; slightly less than 0.28 cu in. in fact, derived from a bore and stroke of 11/16 in. x 3/4 in. From this was developed the production model with 7/8 in. x 1 in. bore and stroke (0.601 cu in. or 9.85cc) which was initially manufactured (while Bill was away at college) in Walter Hurleman's tool and die shop, also in Philadelphia. With one or two exceptions, other manufacturers

(Continued on page 96)



Soaring News

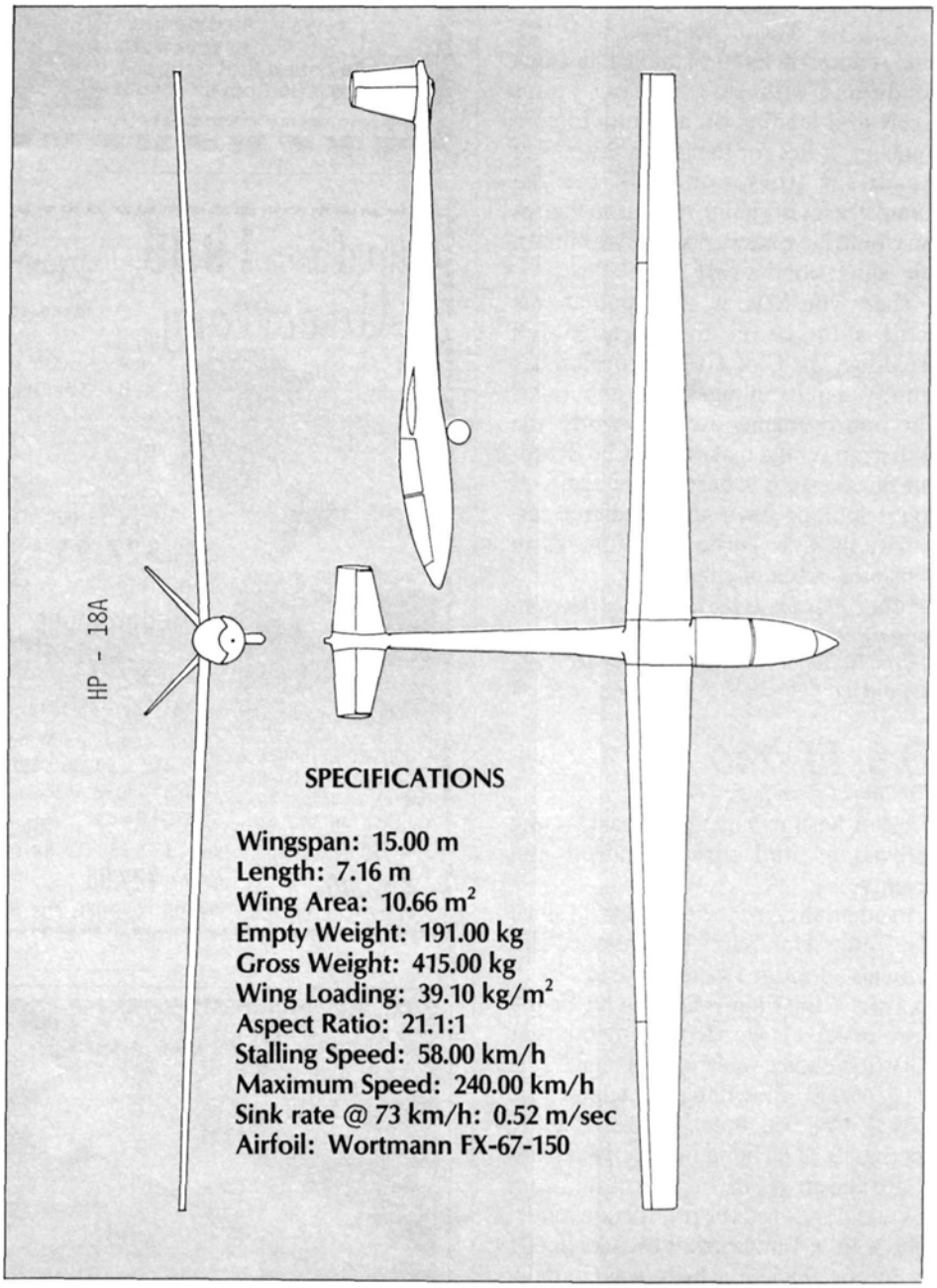
by JIM GRAY

AT THIS POINT in the summer, here's something "cool" for you to think about. Last winter we had snow on the ground here in New Hampshire from Thanksgiving onward, and it grew and dwindled with each succeeding snow, ice, or rain storm, leaving a mixture of "stuff" on the ground that was a foot deep in some places and a couple of feet in others. Our normal flying field(s) were more or less closed for the winter because of access problems and deep snow. However, there was one "field" that was both accessible and available, and it might well be the very best field we have ever flown from: the frozen surface of a local lake! Yes, that's right, a lake. The ice was about 18 inches thick, and what snow had fallen on it had either been plowed away or blown away for the ice fisherman, "three-wheelers" (ATVs), or others who enjoy the winter outdoors—and that includes glider pilots.

Right away, you might think that we're crazy, because who would look for thermals on a frozen lake, right? Wrong! The sun was out nice and strong, the sky was blue, and the wind calm-to-light. On a couple of occasions we staked the hi-start to an island in the lake, and on others, we staked it to shore, as there was a nice offshore breeze. Ordinary heavy shoes work fine, and, under the bright sun, even a light sweater is plenty. You can get a sunburn too, as most skiiers know.

Anyway, the flying was great! Yes, thermals were present; sometimes coming from the shore, the woods, the roofs of houses, etc., and sometimes seemingly coming from nowhere—meaning the lake itself! I don't pretend to understand this phenomenon of thermals appearing over a snow-covered lake, but there they were.

Typically, the air would grow still and



A candidate for a beautiful scale sailplane is the HP-18 designed by Richard Schreder of Bryan, Ohio. This was a particularly good sailplane, suitable for light-lift conditions, and incorporated features synonymous with Schreder designs: a 90° V-tail and large-span trailing edge flaps for glide path control. Although a bit outdated by current standards, the HP-18 would make a fine scale model and is still a worthy competitor in full-scale soaring.

perceptibly warmer around us. Suddenly, the thermal would break loose and the cool air would rush in to fill the void, often changing the direction of the wind. Now it may well be that the thermal itself was being generated on land adjacent to the lake, but it sure didn't seem so. The feeling was almost identical to the one you get in a large open grassy field when a thermal breaks loose, except for the temperature of course. Nevertheless, when there is a difference in temperature between one area and surrounding areas, no matter what the ambient temperature may be, there is a thermal potential.

Those of you who live in the North know this already. If you don't, go out and fly from a frozen lake surface. One word of caution: don't go out on a lake where the ice is thin, or where it's melting and breaking up, and especially where it might have some spring-fed water underneath because in these spots it can be treacherous. Be sure to go where heavy vehicles have been, and where you know the ice is thick and strong.

The advantages of the lake are the lack of glider-eating trees, plenty of room to lay out your launching apparatus in almost any direction, and the reasonable access at a public beach.

You might want to put a dark-colored canopy on your sailplane so that it will absorb the sun's heat and keep the radio and battery warm. A nice, dark-colored cloth or tarp to put your toolbox, the radio, and the glider on will keep things warm and dry. Try it, I think you'll like it!

"Soar-ces"

There are some very nice products out these days, and I'd like to let you in on a few that I've come across recently.

The first is a beautiful F-4 Phantom jet sailplane put out by Howard Metcalf Models* in England. This glider is an accurate-outline scale machine, with a fuselage made from molded ABS plastic. A set of plans, instructions, and optional foam wings—with or without balsa covering—are available. There is also a beautiful set of decals included with the kit.

The Phantom can be flown from a flat field with a hi-start (bungee) launch, or—more practically—it can be flown from a slope in a light breeze. With two mini-size servos (aileron and rudder), a lightweight battery pack and receiver, your Mini jet can be flown smoothly and realistically through some neat maneuvers.

The completed glider will have a wing loading of about 14 ounces per square foot; a bit on the high side for those of us used to out-and-out thermal soarers, but plenty good for those used to flying the slopes. If you use the built-up 31-inch balsa wing and tail surfaces, you can make the weight okay. The blue-foam wing can be simply finished according to instructions, if you don't have the time to build a wing, and is very successful.

Details are given for conversion to a .09 Cox Medallion engine for example, which can be used to launch and/or fly this "powered slope soarer" as it's called in England. The fuselage is 37 inches long, and takes about an hour to assemble. Metcalf Models expects to introduce two other scale models soon: a TA-152 Focke-Wulf WW II fighter and a U.S. Navy Cutlass, the "flying wing" jet.

Aerospace Composites* is a relatively new company that has introduced a whole line of Kevlar and carbon-fiber products to the modeling field. These are available in various weights, in woven or laid (random) sheets. There are some very interesting glass laminates available as well, including a fiberglass-foam-fiberglass material that is literally "stiff as a board."

Glass cloth is also available in various weights. There are unidirectional fiber materials, cross-ply materials, impregnated materials, and the like. For example, some of the carbon and Kevlar materials are as light as .5 ounce per square yard! There is an especially nice fiberglass cloth material of that weight, too.

If you're planning to build with composites, give George Sparr at Aerospace Composites a big "hello" from me. You'll be glad you did. Ask for his price list.

Viking Models, USA* has some neat things available for all of us. For example, Jerry Slates makes some of the finest molded fiberglass fuselages for scale sailplanes that you'll ever see. He also carries canopies, veneered foam wings, and accessories. If you're in the market for an absolutely scale sailplane in ¼-scale, give Jerry a call or drop him a note. His service is superb and every bit as good as his products. As always, please mention *M.A.N.* and "Soaring News." By the way, he has some very effective tow hooks that are virtually indestructable at only $1.25 a pair, including all hardware.

Bob Banka at Scale Model Research* is someone you ought to get to know. He has taken over the Dale Willoughby line of three-views, Foto-Paaks, and other items that you'll need for documentation of that latest scale machine you're building. Each pack of pictures includes up to a dozen or more photos of instruments; cockpits; landing gear details; front, side, and top views; and detail views of rudder-fin, tailplane, landing gear, etc.

Besides all that, Bob is one of the nicest guys to deal with, and has literally thousands of three-views and photos.

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Giant Steps

by DICK PHILLIPS

WHEN THE beginning modeler starts building kits, he is usually pretty careful to follow the directions precisely. This is as it should be. However, there are times when the instruction sheet can be laid aside and some alterations made.

This is not to suggest the builder should make wholesale changes in the structure of a kit just for the sake of making changes. Far from it. Altering the material or structure of any kit should be done only when such changes will not compromise the results of the construction.

Many popular large kits available today lack something in that they've been designed and produced much as kits have always been done. In some cases, the resulting model is a good one; however, there are some kits which use traditional methods and materials, and which leave something to be desired when compared to what they could be.

I almost always modify kits that rely solely on balsa wood. They might be quite all right when built as designed, but I prefer to have that "little bit extra" I know I can incorporate without penalizing the model's flight characteristics.

Any additions to a model will add weight to it and there are reasonable limits beyond which we should not go. While large models are not quite as susceptible to extra weight as smaller ones, any model can be built too heavy. A Balsa USA Sopwith Pup at 35 pounds is not too heavy, but a Sig Morrisey Bravo at that weight is getting up into a dangerous area from the standpoint of wing loading. Those barnyard-sized wings on the Pup distribute a lot of weight and end up lightly loaded. The Bravo, on the other hand, would get up into the higher wing loading very quickly with its much smaller wing area. The moral of the story is: add weight with caution where it's going to have a marked effect on the resulting wing loading.

How's this for a giant-scale model?

I make two major changes and some minor ones when I build from kits. If the main fuselage longerons are balsa, I almost always change them to spruce. I keep Sitka spruce on hand in a variety of lengths and cut whatever sizes I need from this excellent material. If the original balsa longerons were spliced, I cut my spruce replacements long enough to eliminate the splices and provide greater strength. If splices are unavoidable, I splice only where I can provide a plywood doubler over the splice.

The other major alteration I make is to provide gussets at all fuselage joints. I've elaborated on this point before so I won't belabor it here. Suffice it to say that the addition of light plywood gussets will add dramatically to the strength of the structure without adding material weight to the finished model. The gussets will also stiffen the wooden framework and prevent it from "working" with the possible eventual destruction of the joints.

Adding a few ounces of gusset material to a fuselage will be all but undetectable in the finished model (an extra coat of primer will add more weight) and changing four main longerons to spruce from balsa will not add significant weight either.

Minor changes can include the addition of cross bracing (diagonal braces across the interior of the fuselage) or drag and anti-drag wires (or braces) in the wings (similar to those used on Lou Proctor's Antic models). These can be added as aesthetic touches as well in a model that uses clear covering or unpainted Dacron through which they will show in the right light.

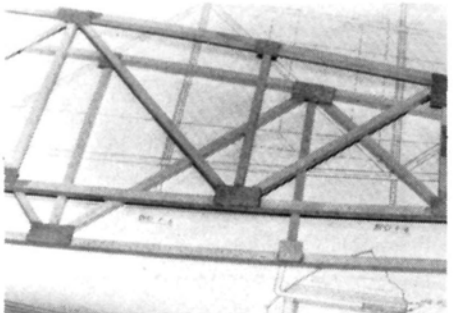
The covering material can add considerable strength to a model. The use of a glider-grade Dacron (Sig Koverall is quite close) can add very significant strength to a model especially if it's applied as an envelope and shrunk in place before being sealed to the underlying structure. (My envelope covering method has also been dealt with previously so, again, I won't go into detail here.)

What I'm saying here is that the instructions for a kit are not engraved in stone and can be changed if there is good reason. Such changes should be made

from a position of experience, of course, and the newcomer to building would be well advised to get some experience first. The changes I've outlined above (and in some previous columns in more detail) are ones that can be safely made without compromising the structure by making it unnecessarily heavy.

Keep in mind that it's not necessary (nor desirable) to try to build a crash-proof model. It isn't possible in the first place, and adding unnecessary weight will make the possibility of a crash more likely. However, judicious addition of strength will result in a model that has a good chance of living for many flights.

Douglas World Cruiser scratch-built by Dick Hershey uses 6.1 cid Kioritz engine.



Truss bracing is enhanced greatly with 1/64-inch ply.

Two New Engines from Quadra

Quadra has recently announced that they are planning two new engines. These will be known as the Q-40 and the Q-65. The Q-40 is slightly more powerful than the original Q-35 and is considerably better built than some of the early models. The really nice thing about this is that the power head for the Q-40 will be a straight-across exchange for the power head on the older Q-35. This means that you can make your older engines into new, more powerful engines by changing the short block (power head).

For those of us who need that "little bit extra" out of a Q-35, here is a perfect way to get it. The exchange takes about 10 minutes (if you're fast and mechanically adept) and requires only common tools. What you'll end up with in place of your 2.07 cid Q-35 is a 2.32 cid Q-40. The crankcase, head, piston, connecting rod, crankshaft, bearings, and seals will be replaced, giving you what amounts to a new engine.

The tentative cost is $65 to $75 for the head. That's got to be a good deal, especially if you're able to resurrect an older engine you've given up on because it doesn't produce enough power to suit you. If you have one of the very early engines, the changeover will provide all the new and good things that have been incorporated into the engines since their original release. Not least among these is the addition of bearings, top and bottom, on the connecting rod and two pinned rings on the piston. The rpm and power increase might very well surprise you.

The Q-65 might be intended to replace the Q-50, although that has not been stated by Quadra. The Q-40 will apparently be the replacement for the Q-35

(Continuea on page 122)

O.S. FF-240

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who subsequently set out to compete with Brown, also opted for the .60 size on the wise assumption that to go to a smaller displacement would put them at a disadvantage since existing spark-ignition equipment, weighing more than the engine itself, would require almost as large a model. A bigger and heavier engine, on the other hand, would be a retrograde step since it was the Brown Junior's lightness and relatively small size that had made it so widely acceptable among the growing band of gas model enthusiasts. These, remember, were the days of free-flight only: no radio or controlline (in fact they weren't even called "free" flight models in those days, since there was no other kind of flight) and a seven or eight foot wingspan was the norm, in order to keep wing-loadings low enough for a nice slow safe flying speed. Bigger engines meant still bigger models that presented problems of transport as well as greater cost and would have had little attraction for the average gas model builder. In due course, the development of smaller ignition coils, operating on pencells rather than flashlight batteries, resulted in the appearance of much smaller engines and this led to the introduction of separate contest classes for different engine sizes. When U-control came along in the nineteen forties and the AMA put an upper limit of .65 cu in. on engine displacement; followed by the establishment, by the FAI, of international regulations governing engine displacements with 10cc (.61 cu in.) as the maximum permissable displacement for any model aircraft engine, the .60 glowplug ignition two-stroke was set for a thirty-year period of development, first in controlline speed and then, from the early Sixties, in R/C.

The break, from rigid adherence to the internationally recognized .61 cu in. displacement limit, came as a result of demands by R/C Scale modelers for more power at *usable* rpm. It was seen in the late Sixties in such engines as the Super-Tigre G.71, Fox 74 and 78 and O.S. Max-80 and, subsequently, in the adoption of converted chainsaw type two-stroke gasoline engines for "quarter-scale" and "giant scale" models. The last ten years, of course, have witnessed the emergence and rapid acceptance of the four-stroke-cycle model aircraft engine and, in the present decade, of large twin-cylinder four-strokes, weighing between 4 and 6 pounds, such as the 2.4 cu in. O.S. Super-Gemini, 2.7 cu in. Saito FA-270T and 3.1 cu in. Kavan FK-50.

The disadvantage of a large displacement single-cylinder engine, especially a four-stroke, is its high level of vibration; the consequence of poor balance and its enormous torque fluctuations through the operating cycle. An alternate-firing horizontally-opposed twin, on the other hand, has near perfect balance and much smoother torque delivery.

Even better is a horizontally-opposed four-cylinder engine, hence the widespread use of flat-fours and flat-sixes for modern propeller-driven light aircraft. And with model aircraft engines becoming even more sophisticated, it was only a matter of time before a production flat-four four-stroke reached the market. That the first such flat-four should come from O.S. is not in the least surprising in view of this company's considerable experience with the various Gemini flat twins over the past seven years, plus the fact that many parts of the current Series II version of the Gemini-120 twin could be used in the construction of a four. These parts include such essential items as pistons, conrods, cylinder liners and

jackets, valves, rocker assemblies and pushrods. From this, it will be realized that the Pegasus has the same cylinder bore as the Gemini-120. It also has the same piston stroke, so its displacement is exactly twice that of the Gemini-120 at just under 40cc or 2.43 cu in.

As this is the first four-stroke flat-four on the market, it is proposed to run a full test report on the Pegasus in the regular "Engine Review" series in the near future. Therefore a detailed description will not be included here. We will, however, satisfy the curiosity of those engine buffs who are wondering about the engine's four-throw crankshaft, by saying that it is supported in five ball bearings; two in the front, one at the rear and two in the center. From this, it will be deduced that, as with full-sized multi-cylinder engines fitted with ball-bearing mains between the crankthrows, the shaft is made in more than one piece, in this instance, two pieces joined at the center.

The Pegasus is slightly heavier (by about 6½ oz) than the Super-Gemini twin of approximately the same displacement, but is more compact so far as width is concerned—only 7.64 in. across the cylinders against the 9.45 in. of the Super-Gemini. The engine is, needless to say, built to the usual high standards of this manufacturer.

The factory's test program on the Pegasus included flight testing in a 98-inch span, 17.6-pound original with a 1,705 sq in. wing area, and in an 86-inch Sig Clipped-Wing Cub of 1,300 sq in. weighing 16.3 lb. Fuel tanks of 700cc (24.7 oz) capacity were fitted, giving flight times of between 13 and 15 minutes. The Cub flew on 18x10 and 18x12 props and the original on 18x12 and 20x10. Typical rpm on Zinger props of these sizes ranged from 6,300/6,600 on 20x10s to 7,300/7,600 on 18x10s.

Peter Chinn, c/o *Model Airplane News,* 632 Danbury Rd., Wilton, CT 06897. ■

SUPER-TIGRE S.3000

(Continued from page 23)

S.3000 is no heavier; on the contrary, it checked out at 1.1 oz lighter than the S.2000/25. This is accounted for mainly by the bigger engine's thinner-walled cylinder liner (wall thickness is reduced from 2.25 to 1.5 mm) and fractionally lighter main casting which has thinner cooling fins and, in places, slightly thinner wall sections.

The S.3000's 5.0 mm greater height is not simply a reflection of its increased piston stroke. Stroke is lengthened by only 1.0 mm, the 3000's bigger volume being mainly a product of a 2.5 mm enlargement in cylinder bore. Closer examination discloses that the increase in cylinder height has been adopted mainly to allow a 4.0 mm increase in connecting-rod length. This restores rod-length/piston-stroke ratio to a figure (1.806) mid-way between that of the original S.2000 (1.857) and that of the S.2000/25 (1.733). To have retained the original rod would have meant a ratio of only 1.677 for the S.3000 and a rod as short as this goes somewhat against current Super-Tigre practice. A short conrod means, among other things, increased angularity and, therefore, increased piston side-thrust.

Since they have to cope with higher pressures resulting from a near 20 percent increase in cylinder swept volume, the conrod dimensions and also the crankpin size, have been increased. The crankpin is enlarged from 9.0 mm diameter to 10 mm and its length is increased from 8.5 mm to 10 mm. The bronze-bushed conrod lower eye has been enlarged accordingly. Wristpin diameter is unchanged

SUPER-TIGRE S.3000

but the rod bearing is lengthened from 9.5 mm to 10 mm. Conrod shank thickness is increased from 6.4 mm to 7.0 mm and its maximum width is up from 12.4 mm to 13.7 mm.

The S.3000's front housing, crankshaft bearings, prop driver, carburetor, muffler and radial mount are the same as for the S.2000 series. Obviously, it has a new and larger piston but this follows traditional Super-Tigre design, with a conventional compression-ring, vertically pinned against rotation. The cylinder head is slightly modified, the combustion chamber having the same diameter bowl but with a wider squish band.

Like the S.2000 and S.2000/25, the S.3000 uses a standard Super-Tigre Mag-V type carburetor with 42 sq mm effective choke area; the same as is used for the Super-Tigre S.61. This seemingly small size, for a 1.8 cu in. two-stroke, is considered sufficient since the objective is not higher power at high rpm, but (through the engine's increase in displacement) the increased torque at more moderate speeds that is required to turn larger props. The maker's recommended prop sizes for normal use are 18x8, 20x6, and 20x8. The S.3000 is, of course, aimed squarely at quarter-scale enthusiasts who might otherwise use a small chainsaw type motor. It offers a better shape, plenty of power and traditional, sound Super-Tigre engineering.

Peter Chinn, c/o *Model Airplane News,* 632 Danbury Rd., Wilton, CT 06897. ■

ENYA SUPER-SPORT

(Continued from page 24)

Marking a departure from previous Enya sport type engines, the Super-Sport models have Schnuerle scavenging in place of crossflow scavenging, but nevertheless remain distinctively "Enya" in their outward appearance. The traditional Enya layout, featuring the cylinder casing in unit with the crankcase, but with a detachable front housing rather than a detachable backplate, is continued, as are the familiar deeply-finned cylinder head shape and machined bar stock carburetor body. These, along with a solid square-cut appearance, are features that can be traced back to the Enya 19 and 29 models of the Fifties and Sixties, yet the current models look, and are, modern designs in all respects.

Although the suffix letters "BB" might appear to suggest that the use of ball-bearings is the only thing that distinguishes the 25BB from the 25, the dif-

ferences between the two models are rather more than this and the 25BB is considerably higher-priced. For example, whereas the 25 is fitted with a standard Enya carburetor with an airbleed for adjusting the idling mixture, the 25BB has the more sophisticated Enya G5.5 carburetor. G-Type carbs, as Enya users are aware, feature fixed automatic fuel metering that matches fuel delivery to throttle opening but retain an airbleed for fine-tuning the idle mixture. The G5.5 carburetor also has a slightly larger effective choke area in the interests of increased top end power.

The crankshaft of the standard 25 has an 11.5 mm diameter main journal that runs in a full-length bronze bush. It has an 8.5 mm bore gas passage and a 12.5 mm long valve port. The crankweb is 8.4 mm thick and its flanks are cut away each side of the 5 mm solid crankpin for counterbalancing.

The 25BB shaft has a 12.0 mm main journal and runs in a 12x24 mm rear, and a ¼x¾ in. front, ball journal bearings. It has the same size gas passage, but its slightly shorter (11.0 mm) valve port is wider, thereby extending the intake period.

Both engines use a ringless cast-iron piston running in a hardened steel cylinder liner having a 1.8 mm wall thickness, through which there are angled and inclined Schnuerle ports flanking an unbridged exhaust port, with a single upwardly inclined third port diametrically opposite. Both engines also use unbushed conrods and identical cylinder-heads in which a shallow bowl-shaped combustion chamber is surrounded by a 2.8 mm wide flat squish-band.

The mufflers supplied for use with these two engines are different. Both are conventional non-baffled expansion chambers, but the M250 has a volume of 24 milliliters with a 28 sq mm outlet area, whereas the M251, for the 25BB, has a 40 ml volume and a 45 sq mm outlet area to reduce power loss.

Prop sizes recommended by the manufacturer are 10 in. diameter of 4 to 6 in. pitch, or 9 in. diameter of 6 to 7 in. pitch. These apply to both engines since the more powerful 25BB needs to be allowed to run a little faster. Power outputs, quoted in PS (*Pferdestarke*) or metric horsepower, are indicated in the data table.

Peter Chinn, c/o *Model Airplane News,* 632 Danbury Rd., Wilton, CT 06897. ■

Offshore

by JOHN OIAN

I DON'T NORMALLY give race results in this column because, in most cases, they are of interest only to local participants. Each year in January, however, there is a race held in Orlando, Florida, that draws competitors from most of the country: the Winternats, hosted by the Orlando Culvert Dodgers.

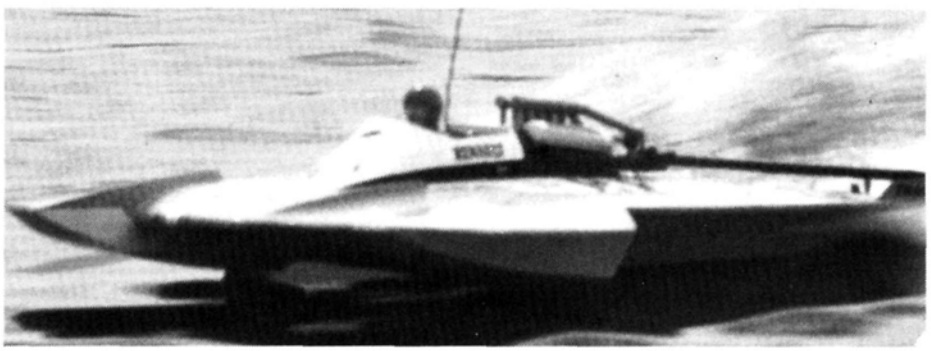
If you remember from the May '86 column, Mother Nature drowned out the January date, so the race was postponed until March. Because of the postponement, I thought for sure that only the locals would show, but quite a few out-of-towners returned. The weather was great this time. I wasn't able to participate because I'm in the process of moving to California, but I did get a chance to wander around on one of the days to take pictures and talk to contestants.

Model boating is in a constant state of change and this race was no exception. There seems to be a resurgence of the canard hydros. There was a Stilletto hull powered by a K&B .67 that was really impressive. The boat was run by Raymond Smith of Washington, D.C., and took second place in the 60 hydro class. It would have been first if it hadn't been for a minor mishap in the last heat. Ray had a couple of other canards which also ran well. I understand that the MRP Canard runs very well as a .40 inboard.

Another trend that is holding is the appearance of the tunnel hulls running in the hydro classes. These hulls don't seem to have the all-out speed of a good outrigger, but they'll turn inside the outrigger every time. Speaking of tunnels, Joe Mathews showed up with a twin K&B .67 outboard-powered Tilton hull.

The exotic materials are also working their way into the hobby. Fred Totem had a Bill Fritz (Class Glass) Miss Squire Shop scale hydro. The hull was Kevlar epoxy with honeycomb to strengthen the flat running surfaces for a total weight of 14 pounds. Bill also produces very nice decal sets and his glass work is excellent.

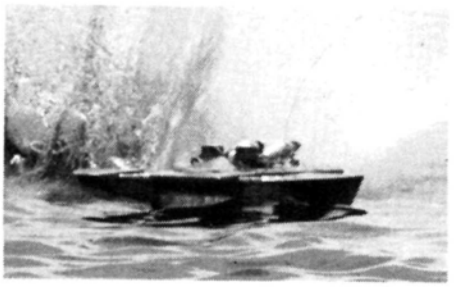
Scenes from the Winternats in Orlando, Florida. Fred Totem and Squire Shop scale hydro. The hull is built from Kevlar and used honeycomb structure to stengthen flat running surfaces. Total weight is 14 pounds.



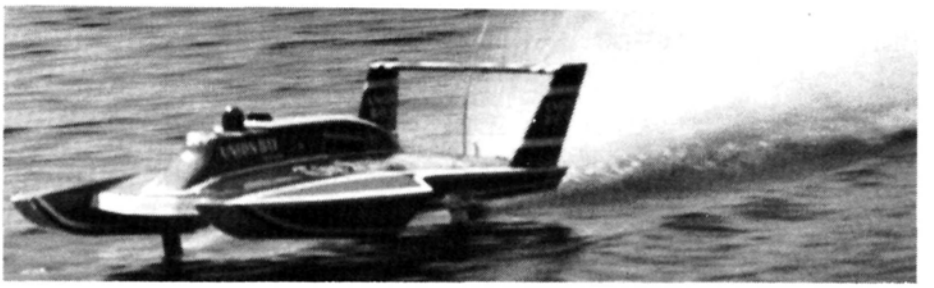
Art McDougal was first in Sport 40 class with his scale hydro, Miss Renault.

I've got one of his cowls that will soon show up on a Tosti Asti scale hydro.

I also saw a tunnel outboard (scratch, of course) by a former full-size boat

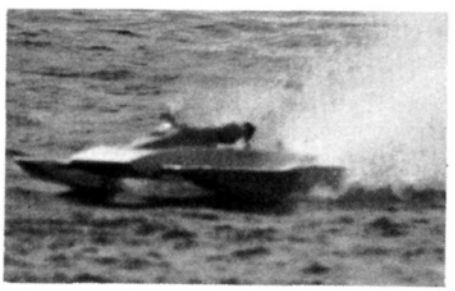


Tom Pretzfield's Twin F hydro kicks up a wake.

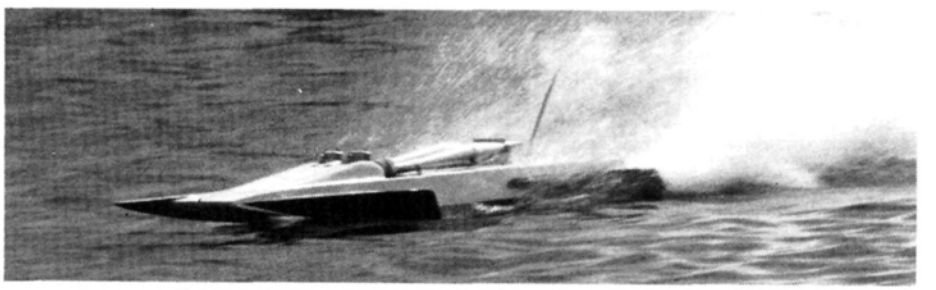


Another of Fred Totem's super boats really moving out.

Fred McBroon's twin tunnel.



Fred McBroon's 60 hydro.



Sid Broughton ran this twin F hydro at the Winternats.

racer, Bill Parker (33 years in the big stuff). The most unique thing about Bill's boat was the stand. It was a detailed aluminum boat trailer, complete with lights and hitch.

Another thing that sets this race apart from most others is the support given by Bob Murphy, owner of Shamrock Imports; the source of all our fine OPS engines. This year he donated $3,000 worth of engines, which were given to the contestants in drawings throughout the race. This year I was very fortunate and received a new OPS .67, which will find its way into the aforementioned Tosti Asti. Thanks, Bob, for your much-appreciated support.

The results of the 1986 Winternats were:

B Hydro class: Andy Brown, Craig Hutson, and John Otto.

B Mono class: Doug Floyd, Randy Dicks, and Mike Weedin.

D Hydro class: Fred Cotten, Max Abellama, and Jim Luey.

D Mono class: Ed Knodsen, Ken Vaugn, and Cindy Rosek.

E Hydro class: Jose Mendana, Raymond Smith, and Jack Treadman.

E Mono class: Randy Dicks, Dick Moore, and Bob Rozek.

F Hydro class: Stuart Barr, Bernard Bathauer, and Fred McBroon.

F Mono class: Dick Moore, Sid Broughton, and Dick Moore.

Scale Hydro class: Gus Johnson, Art McDougal, and Jim Fitzgibbons.

Sport 40 class: Art McDougal, Bill Crawford, and Gary Hutson.

B Tunnel Hull class: Greg Keene, Joe Ingrao, and Bob Seman.

D Tunnel Hull class: Joe Ingrao, Stewart Bain, and Conley Whiddon.

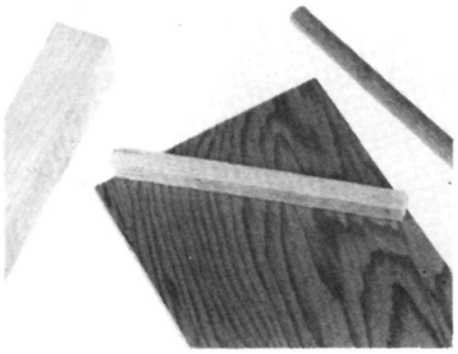
John Oian, c/o *Model Airplane News,* 632 Danbury Rd., Wilton, CT 06897. ■

How To:

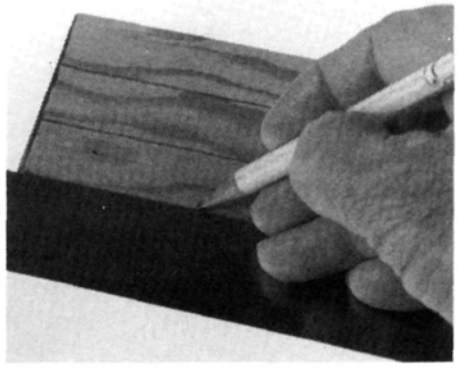
by RANDY RANDOLPH

MAKE A SLIDING BAR CLAMP

The sliding bar clamp has been in existence nearly as long as there has been something to clamp. This version has wide applications for the modeler and is quite easy and inexpensive to make. The one shown is an intermediate size and clamps of various sizes for different situations can be made when the need arises.



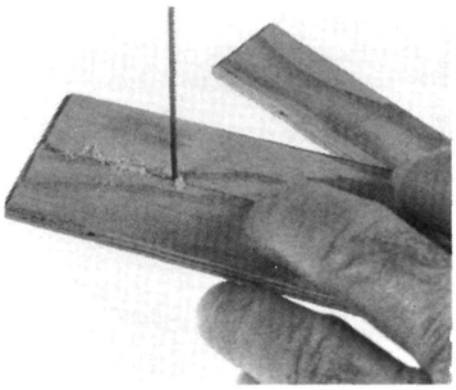
1.



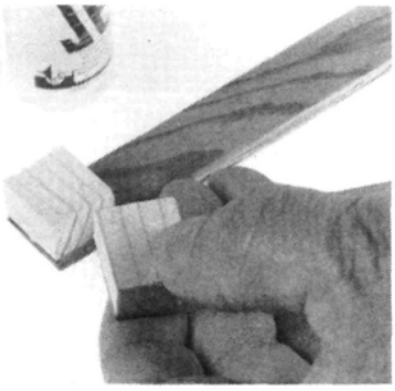
2.

1. The necessary materials include ⅛-inch plywood, a length of ¼x¾-inch hardwood, a ¼-inch hardwood dowel, and some balsa for a pad if desired. Some ⅛-inch plywood is recommended for almost any size clamp with the exception of the very largest.

2. Cut the piece of plywood to a length of 6 inches and mark off ¾ inch segments. Part of the clamping action comes from the flex of the plywood arms, so make them at least 8 times as long as they are wide.



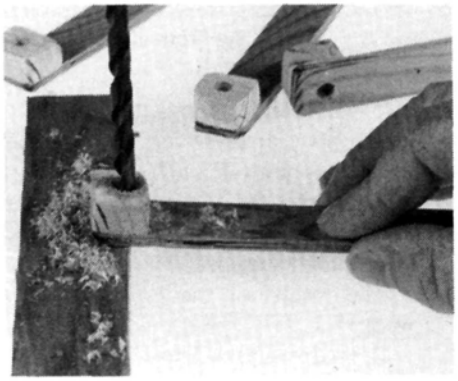
3.



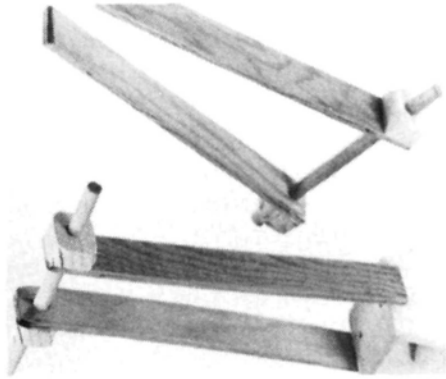
4.

3. Saw the arms from the plywood sheet. This can be done without a jig or band saw by repeated light strokes with a razor knife along a metal straightedge. Round the edges with sandpaper.

4. Cut ¾-inch square pieces from the ¼-inch hardwood and glue these pieces to the end of the plywood arms. If white or aliphatic resin glue is used, be sure to clamp until the glue has set.



5.



6.

5. Prop up the hardwood end of the arms with a piece of ¼-inch plywood and center drill them with a ¼-inch drill. This is done so the hole goes through the hardwood and the arm at the angle shown. This is important for proper locking action.

6. Run any convenient length of ¼-inch dowel through the holes and assemble the clamps as shown. To use them, place the arms in position on the work and squeeze them together at the dowel end; they will lock in that position. The ends of the arms can be padded with balsa and sandpaper for a firmer grip.

FOX 15 R/C

(Continued from page 25)

equipped 15 R/C.

There have, of course, been periodic updatings (an improved 15 R/C was tested for the November 1970 *M.A.N.*) particularly in regard to the speed control system. Early models had pivoted exhaust baffles linked to the carburetor, until these were made obsolete by the adoption of mufflers. And to facilitate muffler installation, the engine's body casting has twice been modified with the addition of attachment lugs. The latest change has been the switch to a twin-needle type automatic mixture control carburetor like that fitted to the more expensive 15BB R/C model.

Looking at the engine as a whole, it is, as the photos show, a simple and straightforward design. A single casting embraces the crankcase, cylinder jacket and front housing and this uses an alloy having good bearing properties thereby eliminating the need for a bronze bushing for the ⅜ in. diameter crankshaft journal. The drop-in leaded-steel cylinder sleeve is generously ported and the lapped Meehanite piston, which has a straight baffle on a flat head, is coupled to the connecting-rod with a pressed-in wrist-pin. The cylinder-head forms a wedge shaped combustion chamber and is fitted with a Fox short-reach idle-bar glowplug.

In past *M.A.N.* tests, Fox 15s have been run on various fuels and with different compression-ratios. Unlike some of the more recent large Fox engines, which have been set up to run on straight methanol/castor-oil fuels, the 15s like a medium nitro fuel. They have performed well on Fox Missile-Mist fuel and the last 15 R/C to be tested produced 0.29 bhp at just under 15,000 rpm, when running on Missile-Mist and a 0.010 in. head gasket, as fitted to the current model. The recommended prop size for general use is an 8x4.

Finally, a word about the Fox's big brother, the Eagle-III. If, after reading Dan Santich's favorable comments in the April *M.A.N.*, you still have any doubts about how well one of these can perform, just fish out your old copies of *M.A.N.*, and check our full test report on the Eagle-III in the October 1981 issue. Then newly on the market, a much improved redesign of the Eagle-II, the Eagle-III more than held its own, power-wise, with contemporary imports, especially for the way it handled big props.

Peter Chinn, c/o *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06897. ■

F&B: PARAT

(Continued from page 84)

mounting holes to accept the blind mounting nuts which secured the engine. Having accomplished this, I added the balsa blocks to the nose area and sanded and shaped the entire fuselage to conform with the plans. I had to add wood to the nose of the fuselage because the O.S. Max .20 was a little bit longer than a conventional two-cycle engine.

The tail surfaces (rudder, elevator, and stabilizer) are constructed from balsa sheets the same as most R/C model planes, so enough said about this.

I used a combination of radio components for the TF 1. The transmitter is a Hobby Shack* Cirrus 7 and the receiver is a Litco 5-channel. The three servos are Indy R/C* RAM servos and I've found this combination to be quite effective. The installation of the radio is quite simple and there is plenty of room for just about any type of radio system you choose.

I covered the model with white Top

Flite* Super MonoKote. I offset the red trim with black 1/16-inch trim. Having completed the covering, I installed the engine, the 2-ounce Pylon Brand fuel tank, and attached the landing gear.

FLYING. The TF 1 was ready for testing so off I went to the flying field. Since I had already run the O.S. .20 on the test stand for a period of time there was no problem starting it and after a few adjustments I was ready to begin. I pointed the TF 1 down the runway, gave it power, and in less than 20 feet it was airborne and as steady as could be. The model flew perfectly in every way; it was stable and forgiving no matter what I did with it. It does loops, spins, and rolls that almost make you think the model has ailerons. In fact, it will do just about anything that you put your mind to and with only rudder and elevator. When it came time to land, it just about landed itself; slow and extremely stable.

This model is a winner for the newcomer to R/C. It's a stable but responsive trainer and with the O.S. Max .20 four-cycle engine, it's an ideal combination. There is plenty of power but not the speed that would normally give the beginner trouble.

**The following are the addresses of the companies mentioned in this article:*

Robbe, 180 Township Line Rd., Belle Mead, NJ 08502.

Satellite City, P.O. Box 836, Simi, CA 93065.

Great Planes Model Distributors Co., P.O. Box 4021, Champaign, IL 61820.

Hobby Shack, 18480 Bandilier Circle, Fountain Valley, CA 92728.

Indy R/C Sales, Inc., 10620 N. College, Indianapolis, IN 46280.

Top Flite Models, Inc., 2635 S. Wabash Ave., Chicago, IL 60616. ■

F&B: LASER

(Continued from page 30)

a moot point since, with the wing positioned as deeply as it is within the fuselage, any impact great enough to shear the bolts will most likely destroy the fuselage. So much for preference.

The practical change was the method of retaining the vacuum-formed cockpit/fuselage section over the wing. The kit provides four small sheet metal screws, which are fine until you realize that they must be removed every time you take the wing off, which is every time those of us with normal cars go to the flying field—twice each time actually, if you're lucky enough to go home with an airplane. My solution is to use four small strips of velcro. The cover comes off in seconds and holds on well throughout the flight envelope. Give it a try, your local department store should be able to provide the material.

FLYING. The Laser is a pleasure to fly. It makes you look better than perhaps you really are. I have "dragged" the airplane in on landing with the nose higher than you'd normally expect and it remained completely manageable right down to touchdown. The kit now includes an aluminum tube stab bracing which probably will permit higher levels of high G aerobatics. I've really pushed this airplane with no faults detected.

So there you go—this is one case where "new" apparently is more than a skin deep, cosmetic change. This is a great way to enjoy a fine flying sport scale/pattern airplane within a week of opening the box. Give it a go!

**The following are the addresses of the companies mentioned in this article:*

Hobby Shack, 18480 Bandilier Circle, Fountain Valley, CA 92728.

Enya Model Engines, Altech Marketing, Inc., P.O. Box 286, Fords, NJ 08863. ■

LIBERTY SPORT

(Continued from page 21)

sheeting, making for a stronger attachment.

The front end of the sliding part of the canopy must have a frame made from ⅛-inch ply to strengthen it. This whole structure should only be made, assembled, and attached to the fuselage after the model is completely finished and painted. I also made a little spring latch to ensure that the canopy stayed closed in flight.

Most of the wing ribs are made from ⅛-inch square balsa strips with the nose section from ⅛-inch sheet. I used the sandwich method to make the nose pieces. I made a jig from two pieces of ⅛-inch ply; one was the base with the construction drawn on and the other had the rib outline cutout. I clamped them together with a sheet of plastic in between to keep the ribs from sticking to the jig.

Make the ribs inside the cutout, one by one, and take them out of the jig when dry. The ribs can be built using cyanoacrylate, but it still takes a long time to make them all. I used white glue and built two a day while I was still drawing the plans. By the time I was ready to build the wing, I had made all the ribs.

On the plans, only ribs W3 and W4 are shown built up because all of these can be made from the same jig. In the prototype, I made ribs W1 and W9 in the jig by lining the inside of the jig with a strip of 1/16x⅛-inch so that each rib was made thinner for the center section sheeting. The only thing to remember here is to trim the ⅛-inch outline strips at the spar positions 1/16 inch so the spars can still fit through. If you're not keen on building ribs like so many fuselage sides, you can cut them all out from ⅛-inch balsa sheet.

Make the spars before beginning the wing construction. I cut the main and rear spars to length and glued in ⅛-inch vertical grain webbing as per the front view on the plan. The wing tips must also be made before general wing construction can commence. These are laminated from four pieces of 1/16x½-inch balsa. Soak the wood in warm water for a while and bend round a series of pins stuck in the plan around the inside line of the wing tip. Using white glue, laminate all four strips and let dry for 24 hours. Tips made this way are extremely light and strong and look very scale-like after covering.

Now construct the wings. Slide the ribs over the spars and pin the spars to the building board by packing the main spar ⅛ inch and the rear spar ¼ inch. Construction is quite straightforward and I won't go into detail here. Don't omit the ⅛-inch square diagonals, as they really stiffen up the entire wing and add very little weight. For the aileron hinges, I used 5/32-inch plywood hinges with 3/32-inch brass tubing inserted as a bearing. Glue some 3/32-inch aluminum tubing on the rear of the aileron leading edge and use 1/16-inch steel wire as a hinge pin. Details of all this, plus the aileron bellcrank mount, can be seen in Section A-A of the plans. The hinges work well with this method and are much stronger than the standard nylon type. Another advantage is that the 1/16-inch pin can be removed at any time, thereby releasing the aileron for covering, painting, or even repairing.

The bottom wing is built as one piece with a flat center section and dihedralled outer sections. Build the center section first and cover it with 1/16-inch sheet. This is then used to complete the wing mount on the fuselage. Attach it to the fuselage with two ⅜-inch wooden dowels in the leading edge going into holes in former F2 and two ¼-inch nylon bolts threaded into hardwood blocks at the trailing edge. When doing this, glue in the 1/64-inch ply wing seat so that it seats properly on the wing. After this is done, remove the center section and build the outer sections of the lower wing onto the center section with the proper dihedral.

The top wing has detachable outer panels using steel rods and brass tubing just like glider wings. Glue the steel wing rods in the outer panels through the plywood pieces W12 to W15, and strengthen with packing pieces. Glue the brass tubes between the top and bottom members of each spar and fill up the gaps with scrap spar material. Glue in the rods and tubes while the wings are pinned to the board so that everything is lined up perfectly.

Note: When the model is finished, the center section of the top wing is a permanent fixture on the fuselage and the outer panels just plug in. No other method is needed to keep the top wing in place, as the rigging wires and N-struts are sufficient to hold the panels in place and they won't move under all flying conditions, even violent aerobatics. Incidentally, don't sheet the entire center section of the top wing until after fixing the cabane wires as described below.

For the tail, the rudder outline and tailplane tips are made in the same way as the wing tips. The rest of the construction is quite straightforward and hinging is done with conventional nylon

heavy-duty hinges. Make sure that there are at least four hinges in each elevator and four in the rudder. The scale servo-tab on the left elevator is functional and assists the servo in moving the elevators. Both elevators are separate, not being joined together at the center, and each elevator is operated by its own servo.

With the lower wing in place and the model set up so that the wing is at 0° incidence, check the fit of the tailplane. My tailplane was set at 2° positive incidence and flies level with level elevator. When all is aligned correctly, glue on the tailplane. Build the fin onto the fuselage, and with the rudder and elevators temporarily hinged, install the control system, as described below. Now is the time to finish the fuselage sheeting at the wing mount and tail end, and also complete the wing fairing, which I did with ½-inch sheet balsa and micro-balloons.

Now comes the hardest part and that is fixing the center of the top wing and the cabanes. Bend the 5/32-inch steel wires as per the plan with only about ½-inch length going into the tubes on formers F1 and F2. Attach the top of these four cabane wires to their ⅛-inch ply plates and position them between the ribs in the center section of the wing. With the lower wing in place and the fuselage packed up until the lower wing reads 0°, measure the top section of the wing until it lines up 0° and is straight in all directions. Line up the front of the wing by clamping two strips against the front of fuselage former F1 and laying these strips against the ¼-inch false leading edge of the center section of the wing.

Now tack-glue the ply plates in place. Recheck with the outer panels of the top wing in place that all is square and correct. When you are happy that this is so, glue the ply plates in place and strengthen the attachments with strips of balsa on all edges against the ribs and spars. When this is done, bend and solder the ⅛-inch steel diagonal braces to the cabanes. When all is dry, take the whole top off by springing apart the cabane wires out of the tubing on F1 and F2. You can now sheet the center section top and bottom, fit the leading edge, and sand all to shape.

Incidentally, the rigging wires will be attached via 1/16-inch cotterpins, so put the cotterpins in place through small plywood brackets before sheeting the bottom of the wing panel. This top section of the wing is only epoxied in place on the fuselage after covering and sealing and just before painting. Only after it is glued in place can you make and glue on the balsa fairing around the cabane wires. This also applies to the aluminum plate sections on the rear of the wing. These are only made and glued in place with cyanoacrylate after filling, just before painting.

With the wings in place and set up correctly, make and fit the N-struts. Cut these from ¼-inch plywood, carve to a streamline shape, and slot on the ends to fit over the brass pieces epoxied in the wings. Don't forget to put the rigging wire attachments in the wings, which are 1/16-inch cotterpins epoxied through plywood pieces in the appropriate places. These need to be quite strong, as the rigging wires are functional and must withstand the strain of flying and landing loads.

Solder the undercarriage from two pieces of 7/32-inch steel piano wire with plywood filling between the two wires and fiberglass cloth wrapped around and resined in place. The axle pieces are separate pieces of 3/16-inch wire bound and soldered in place. Bolt the undercarriage unit to the fuselage with five bolts and blind nuts so that it can be taken off for transporting, etc. The wheel spats are fiberglass molded from a plug which I carved. They can also be made up in wood by using ply sides with balsa laminates between. Attach the spats to the undercarriage frame with small nuts and bolts through the frame. The shape of the fairing sitting against the spats is shown as dotted lines in the side view drawing.

I found it easy to make a wooden cowl for this model as both the sides and plan profiles are straight and only the front end is curved. The cowl is extremely strong and light.

Make the basic frame of the cowl by cutting C1 and C2 from ¼-inch ply and fitting the ¼x¾-inch strips between them. Tack-glue C2 to F1 and build up the frame on the front of the fuselage. Cover the framework with 1/32-inch ply epoxied on. The front of the cowl is four laminations of ½-inch balsa plus a ⅛-inch ply nose ring. Shape these as shown on the plan. Mold the side air vents from acetate sheet and glue them to the cowl over cutouts so they are functional. The bottom vent is also open where the scale exhausts exit. Attach the cowl to the fuselage with four screws through C2 with blind nuts set into F1. You can get to the screws via the front cooling openings, so no external screws can be seen holding the cowl on.

I covered the model entirely with Solartex and gave it a coat of clear dope

(Continued on page 111)

LIBERTY SPORT

(Continued from page 109)

after heat-shrinking. I simulated rib stitching with small bits of thread doped on and then cut strips of Solartex with pinking shears and ironed them in place over the thread pieces and ribs. I also ironed on the tape round the trailing edge of the wing and tails and all stringers on the fuselage. Various rivets and screw-heads are blobs of epoxy glue and panels are represented by typing paper stuck in place with clear dope. After this, I gave the model one further coat of thinned clear dope and it was ready for painting.

The basic colors of the B are International Orange and Forest Green. Don Paquette had sent me samples of the actual colors painted on a card and I had the experts mix me up a tin of Duco for each color. I masked the model and sprayed it with white, orange, and green. I hand-painted the "MADA" insignia and other small lettering on the fuselage, and masked and sprayed the larger lettering on the wings. Finally, I sprayed a coat of clear polyacrethane on top, which gives it a hard gloss finish and is completely fuel-proof. Although the gasoline used on these motors should not affect Duco, which is a standard automotive paint, the gasoline (petrol) used in this country (Zimbabwe) contains quite a lot of ethanol, and this has a tendency to remove normal automotive paint.

For the rigging, which has to be functional, I used the method outlined by Don Godfrey and mentioned in *Model Airplane News* "Giant Steps" in the May 1981 issue. Basically, it is done by using 90-pound braided nylon fishing line with kwik links cyanoed on. Believe me, it works. It is extremely strong and light, and easy to assemble. Don't forget to make and drill the 7/16-inch dowel spreader and thread the line through it

before gluing on the second link on each line.

For extra strength, I used Du-Bro strut links for the tailplane and fin bracing. These can be seen clearly in the photos.

Now on to the controls. A servo is used for each aileron, connected via a Y-lead to the aileron output on the receiver. I used the standard method of a bellcrank to each aileron so both servos were close together in the wing and within the fuselage width, because I did not particularly want extra long leads. Use heavy-duty pushrods, links, and horns and give the ailerons plenty of movement as the roll rate is fairly slow.

The elevators also have two servos on a Y-lead, one for each elevator, using fiberglass arrowshafts for pushrods. All servos used in the model are Futaba, heavy-duty for ailerons and elevator and normal for rudder and throttle, along with a Skyleader.

FLYING. Now comes the good part. Check all rigging angles, control movements, and CG position before going out to the flying field. I use a trailer to carry my model and because of the limited depth of the trailer, I have to take the main undercarriage off. Even so, the model goes together in 10 minutes.

As I said at the beginning of this article, flying the model is the easiest part. Although it can take off within 20 feet, it's much better to let it run on its main wheels for at least 100 feet and then gently ease it into the air with just a touch of elevator, it looks more scale-like this way and is safer too. Turns are better if done with rudder and ailerons together and it doesn't take long to get used to doing them this way. With some radios you can couple the ailerons and rudder with a flick of a switch on the transmitter, but don't forget to uncouple the mixer before doing a roll, as the roll rate is fairly slow and if the rudder moves as well, a very untidy barrel roll follows.

Spins are easily accomplished and they stop the instant controls are neutralized. Landings are easy and predictable. Don't bleed off too much power too soon, as a model like this has a lot a drag and speed drops quickly. Stalls are very gentle and the model hasn't dropped a wing yet. If you get it too slow, it will just drop its nose slightly and keep its wings straight. What more can I say about the easiest flying biplane I've ever flown? And I have certainly flown a lot of them as I just love biplanes.

I must express by appreciation and

thanks to Orval Lloyd for all the help he has given me with information, details, photos, and everything else. I feel that it is quite an achievement to produce a scale model before the real thing has been finished and flown, especially when I live on the other side of the world from the source.

Thanks also to Don Paquette for sending me three-view drawings and information. Without Don and Orval, this project would have been impossible. ■

FOUR-CYCLE

(Continued from page 50)

Other thoughts on the subject have been voiced by Bill Carpenter of C.H. Electronics. His experiences are based on his handling of a lot of engines, and in his newsletter he recently reported:

"About 90% of our work is now with four-stroke engines, but this is where we're needed the most. It seems that many fliers are running their FS engines on glo with no problems, but many are not.

"Nearly every week I have to send back engines that are ruined from rust and corrosion; some of them with as little as one hour's time on them. I'm still blaming this problem on the nitro used in the fuel. The nitro, when burned, creates nitric acid. This mixes with the oil and goes into the engine crankcase to lube the engine bottom end. The acid will etch the bearings, the engine will draw moisture, and the bearings will rust as well as the other iron parts. It doesn't make any difference if you run your engine on spark or glo; if you use a nitro methanol fuel, you can have this problem. Even using castor oil is not a sure cure.

"There are a couple of things we can do to help prevent this. First, run the engine full-throttle on the ground and starve off the fuel supply when shutting down after a day's flying. Then oil the engine with a good after-run oil. It seems nearly everyone is using Marvel Mystery oil. Put a good shot into the crankcase through the breather and turn over a few times. It doesn't hurt to put a few drops into the exhaust pipe and turn the engine over backward a few times. Be careful not to hydraulically lock the engine. This may foul the spark plug if the engine is inverted. Store the engine in the driest place possible and oil it every few weeks if it's not being used.

"This sounds like a lot of trouble but these engines are expensive, and they are

FOUR-CYCLE

so well designed and built that we should take care of them.

"If your engine shows signs of rust coming out of the front bearings or feels rough when you turn it over, don't send it to me for an ignition conversion, as I'll just have to send it back. In most cases, these engines can be saved with new rings and bearings.

"I've seen some engines with pitted and ruined camshafts and lifters. We're also seeing and hearing about engines blowing up, broken crankshafts, bent and broken rods, and cylinders blown off the crankcase. Many of these are on twin cylinder engines. I don't believe that these engines or parts are defective. What causes this is our old friend detonation; one cylinder tries to back up while the other is going forward and something bends or breaks. The only way to completely cure this problem is with a timed spark ignition.

"With a timed spark ignition, you can lean and load the engine without worrying about detonation. Therefore you can develop more power, and with a TCSA (Throttle Coupled Spark Advance) you can get easy hand starts and a very reliable idle.

"In the instruction book on one of my four-stroke engines it says to lean the engine until it starts to knock. My friends, when it starts to knock, it can come apart. One guy told me his FS engine lasted 45 seconds.

"I'm still getting reports of props and prop blades being thrown through plywood doors and other things. I still see people standing in front of their airplane and running the engine at full-throttle. Or worse yet, reaching around behind the prop to adjust the needle valve. *Do not do this with any kind of airplane!* It also says in the instruction book of the same engine that you do not need to oil the engine as the oil is in the fuel. (Good Luck.)"

As I said, we (you, and I, and the manufacturers), still have a few things to learn. On the subject of fuels, Bill has the following to say:

"I'll mention fuel one more time and never talk about it again (just kidding). It seems like I'm confusing people with my different fuel mixes.

"If you don't want to mess with mixing fuel or can't find the right ingredients, you can use a low nitro four-stroke glo fuel with not over 10% oil. I'm still using the methanol/gasoline/ Klotz oil mix. I use 15%-25% regular gas and 8% Klotz KL 100 (10% in new engines). The rest is methanol. If I lived in an area where I could not buy glo fuel or methanol, I'd use all gasoline.

"The FS engines run fine on all gas but are very touchy to carburetor adjustments. I think the gasoline helps the rust problem, as methanol draws moisture. This is the reason to get it all out of the engine when you're done flying."

Time for a New Starter

My electric starter finally gave up the ghost and I had to replace it. I wonder if I sent it back and claimed that it's just as I bought it, will they overlook the obvious "used" look; the turned-down (twice) armature and the almost non-existent brushes, and fix it under warranty?

I doubt if "they" would, since "they" are no longer around. I'm talking about my old reliable Penford Plastics starter, and if you can remember them, you've spun a few props in your time.

My choice for a replacement is not new on the market, but one which deserves a second look. It was made by Kavan, and was chosen for its ability to turn over the larger engines without having to resort to a large motor or heavy battery currents. It does this by using an old but proven method—it's gear driven.

That's right, like your automobile in first gear, it will not reach extremely high speeds, but it does develop a lot of torque. Since the four-cycle engine doesn't need high speeds for starting, it seems like an obvious combination, doesn't it? The Kavan starter, powered by a 7-amp battery, turns over my O.S. FS-120 just like the old Penford did—when I took out the plug!

There are a couple of other benefits; one, it's small in diameter, and since I have small hands, I find it comfortable—and safe—to hold. Of more importance it has replaceable brushes. Yes, I know you can replace the brushes in any motor, but the Kavan company readily supplies replacements, and even includes instructions on how to install them. Kavan products are distributed here in the U.S. by Hobby Shack*.

Next month I'll let you know what this spring's trade shows had to offer in the way of four-strokers.

Eloy Marez, c/o *Model Airplane News,* 632 Danbury Rd., Wilton, CT 06897.

**The following are the addresses of the companies mentioned in this article:*

Verdell Instrument Sales Co., P.O. Box 3821, San Clemente, CA 92672.

Hobby Shack, 18480 Bandilier Circle, Fountain Valley, CA 92728. ■

ABOUT ENGINES

(Continued from page 77)

a better lubricant than motor oil, and alcohol is much less inflammable than gasoline.

In the "good old days" there were exhaust stack extensions made for model airplane engines. They helped prevent fires and also reduced the accumulation of oil on firewalls and windshields. First were stacks for Brown and Bunch engines. These were round steel tubing, ¼-inch in diameter by 5 inches long, with a crescent-shaped cutout in the middle to fit over the exhaust port holes in the cylinder. This type of stack was attached with a sheet-metal strap around the front of the cylinder, clamped with a screw and nut at the front. (If you see an old Brown or Bunch motor with a pair of dimples at the top of the front bypass cover, you'll know it once had one of these tubular stacks installed. Tightening the clamp screw firmly would dent the thin steel bypass cover every time.)

Engines with side exhausts, such as the Ohlssons, were often fitted with extensions formed from thin aluminum sheet. These had the same cross-sectional shape as the engine exhaust stack, and clamped around it. The length was usually about 2 inches—just enough to contain the belch of flame from a backfire.

Arden engines, with exhaust ports completely around their cylinders, were occasional fire-starters, in spite of having their fuel tanks on the base of their crankcases. To overcome this problem, and also to duct the exhaust out from a cowled-in motor, Ray Arden came up with a clever telescoping arrangement of two U-shaped aluminum stampings. These fit snugly around the Arden's exhaust ports, extending outward an inch or so on either side. However, they caused severe power loss and were seldom seen on models. Today they are collectors' items.

If you would like to obtain the names and addresses of the current makers and suppliers of spark ignition engines and accessories, SAE 70 oil, and spark plugs, write to me, enclosing a stamped, self-addressed envelope, and I will send you a complete listing of all the sources I know of.

Joe Wagner, c/o *Model Airplane News,* 632 Danbury Rd., Wilton, CT 06897. ■

Under the bottom cover, left to right, is the V-tail mixer switch and four sets of pots to set end-point adjustments (EPA) for landing gear, rudder, elevator, and aileron. These controls are individually adjustable and allow you to customize your servo linkage throws so that you don't stall any of your servos. It should be noted that the front panel throttle trim also provides end-point adjustment, but only at the idle end of the servo throw which is really where you need it.

This completes a discussion of all the transmitter controls. Figures .1 and 2 graphically identify the controls discussed. The receiver and servos are fully described in the summary of features earlier in this article.

The following optional accessories are also available for the Century 7 radios: Trainer cord JRTC001, 270-mAh battery pack JRB270, 600-mAh battery pack JRB600, 1,000-mAh battery pack JRB-1000, 1,200-mAh battery pack JRB1200, and Y-harness JRA002.

Let me say that the Circus Hobbies Century 7 is a quality radio set. I've had several months of evaluation without any problems whatsoever. I've also enjoyed flying it and at $299 it's quite a buy. I particularly like the EPA feature and, of course, it's a single-stick transmitter and they are getting hard to find. See you next month.

Charlie Kenney, c/o *Model Airplane News,* 632 Danbury Rd., Wilton, CT 06897.

**The following is the address of the company mentioned in this article:*

Circus Hobbies, 3132 S. Highland Dr., Las Vegas, NV 89109; 1-800-782-0022. ■

FROM THE COCKPIT

(Continued from page 69)

you're mind is still back there on the runway. As a hot rod, she's *really* hot!

Once off the ground and over the trees, you find yourself with your hand wrapped around one of the finest sets of controls ever put in an American airplane. A pilot schooled in Cessnas and Pipers will feel as if he has gotten a hold of a will-o-the-wisp and is likely to overcontrol for the first few minutes. He won't be used to making his mount behave with only his thoughts and his finger tips. You fly a Swift gently—very, very gently, like any thoroughbred. A Ferrari isn't a Ford, an Arabian isn't used for plowing, and a Swift is no piece of hyper-boring Wichita sheet iron.

(Continued on page 119)

Club of the Month

The Hamilton Area Wireless Kontrol Society (HAWKS) of Cincinnati, Ohio, is the *Model Airplane News* Club of the Month for July 1986.

This is a very active radio control club, and president Bill Cook means to keep it that way. Known best for the Four-Cycle Rally they hold each year, the club also has many other activities, which include fun-flies, static shows, and anything else the contest committee can dream up.

Club meetings are held at the Fairfield, Ohio, YMCA on the first Friday of each month and, aside from the usual club business, the members are often treated to entertainment such as slide and video presentations. At the February meeting John Maloney, president and owner of World Engines, gave an informative talk on his recent trip to the Nuremburg Hobby Show and also the new radio called "Expert" World Engines plans to market. Don Seidl asked John about how the new Maloney 100 engine got its name, to which John replied, "I really don't know."

Plans are already underway for the 1986 Four-Cycle Rally and if last year's bash is any indication, they'll be giving away a lot of goodies, including an O.S. FT 240 Twin.

Noted builder and laureate author Stephen P. Hill-Harriss is the editor of the club's newsletter, "The Hawks' Squawk," and does a fine job explaining the differences between English modelers and the "Bloody Yanks."

Model Airplane News is pleased to award two free one-year subscriptions to this club for their outstanding efforts, which are to be given by them to their deserving junior members.

Congratulations!

Each month M.A.N. will select the club newsletter that best shows the club's activities and energies directed toward the furtherance of the hobby. The award is not based on size or quality of the newsletter, and can be about any aspect of the hobby (F/F, C/L, R/C, boating, cars, etc.). M.A.N. will award two free one-year subscriptions to be given by the club to outstanding junior members. So send your newsletters to Model Airplane News, Club of the Month Contest, 632 Danbury Rd., Wilton, CT 06897.

FROM THE COCKPIT

(Continued from page 117)

Probably the hardest maneuver in a Swift is flying from point A to point B and keeping the airplane right-side-up for the entire trip. With temptation always present, you'd find yourself pulling the nose above the horizon and playfully rolling right and left, wrapping the blue and brown around the nose. In fact, you could probably set some sort of record in a Swift by rolling continuously all the way across the country. Of course, you'd need a wheelbarrow to carry all the citations issued for breaking various FAA regulations.

In landing the Swift, the method preferred by most is a wheel landing. This is for two reasons: first its wheel lands incredibly easily, once you figure out how long your legs are, and it takes a light touch to successfully three-point the airplane. Four out of five times, when I try three-pointing, I get a little balloon, just as I try to flair and hold it off. Then I'm a couple feet high and out of airspeed—not a good place to be!

This is one airplane that cries to be modeled. In the first place, it has plenty of tail moment to help with longitudinal stability and it has far more dihedral than many scale birds so it'll be naturally stable in a roll as well.

The landing gear, often an area in which scale appearance has to give way to the practicalities of available retracts, would be easy to work out. The only possible problem would be that the Swift's gear legs are just a little on the short side so you might have to look for a while to get just the right match.

The Swift's cowl is made just for hiding a good-size four-stroke. It's unusual because it has inordinately large intake areas, so plenty of cooling air can be introduced without going to non-scale openings.

And lastly, the tremendous variety offered by today's Swift population (nearly half of the original total production) means you won't be meeting someone else flying exactly the same airplane. A trip to any fly-in with your trusty 35 mm will give you the chance to shoot documentation photos on a half dozen Swifts at a time. Or, if you really want variety, travel to Athens, Tennessee, on Memorial Day weekend and spend a couple of days at the annual Swift Association fly-in. Since there are always at least 100 Swifts, as well as several of the ultra-rare Temco T-35 Buckaroos, on hand, you can document yourself blind.

As a model, the Swift offers the scale buff the same thing it offers the full-scale pilot—the opportunity to own and fly an airplane that can be customized to fit your own mind. Of course the full-scale aviator doesn't have to worry about documentation...or does he? ■

GOLDEN AGE OF R/C

(Continued from page 56)

equipment you may have used in the early days. Some of you are still flying your old planes or replicas. Remember when getting in a couple of good flights in a weekend was an accomplishment, and "fly-aways" were a fact of life? You waited for a phone call from a considerate stranger reporting a "find." Several of you reported fly-aways landing in someone's yard with no damage. Another modeler was not so lucky: his plane went through a greenhouse. My own best-remembered fly-away was the prototype Sonic Cruiser that was finally found in Lake Erie. All I got back were two silk bags (the covering) filled with sticks and pieces. The water had dissolved the white glue!

Another trend is the rise in the number of modelers who are still enjoying R/C well into their 60s. Some had left the hobby for other interests and have only recently returned, finding it so much better and easier today. They enjoy it more than ever and find modeling to be the needed diversion they had looked for.

If you're looking for a pal who's interested in OT R/C, perhaps these names will help: Ray Grindle of Daytona, Florida; Ed Hunter of Amory, Mississippi; Don Swinehart of Ashland, Ohio; Jerry Bubp of Bakersfield, California; Pat Ryder of Janesville, Wisconsin; Gary Harbourt of High Bridge, New Jersey; and Dr. Leon Morrisson of Morehead City, North Carolina. That covers quite a few states. Write if I missed you.

It's going to take a continual input of photos and information from you to keep this OT R/C column going. I'd like to acknowledge a couple of especially helpful contributions. Dr. Joseph Makovich of Wilton, Connecticut, checked in with a file of early-day R/C material, photos, catalogs, etc., which will be most useful. A friend of his had been an electronics magazine editor and had saved the stuff. You never know where you'll find good things!

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GOLDEN AGE OF R/C

(Continued from page 119)

Ken Taylor of Phoenix, Arizona, is an old buddy from the Detroit area. In the '50s and '60s, Detroit was a mecca for R/Cers. Sooner or later I'd like to discuss the fabulous Detroit Invitational Meets and the beginning of the Detroit-Toledo Show. Ken was a big help with photos from that time. Anyone else with Detroit material?

Along the same vein I'd like to discuss the Selinsgrove activites. That may be a strange name to modern R/Cers, but it wasn't in the old R/C days. How about you, Fred Collins, Jim Schenk, or Maynard Hill, do you have anything to offer?

I've been receiving requests for OT plans and kits beyond what you find currently advertised. The sources I know of are W.E. Technical Services* for Berkeley, Francis Ptaskiewitz* for Live Wire, and Chester Lanzo* for Personal. If you know of any others, please let me know.

Hal deBolt, c/o *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06897.

**The following are the addresses of the companies and persons mentioned in this article:*

W.E. Technical Services, 526 Lorell Terrace, Atlanta, GA 30328.

Francis Ptaskiewitz, 23 Marlee Dr., Tonawanda, NY 14150.

Chester Lanzo, 1485 Lester Rd., Valley City, OH 49280. ■

GIANT STEPS

(Continued from page 95)

and the 35 will gradually be phased out. Not to fear, however, the 35cc engine will still be produced as a chainsaw powerplant and parts will be available for a good many years to come. Besides, when you finally fly the wheels off your older 35cc engine, just get a new power head and turn it into a Q-40. There will be no outward differences between the two engines; the accessories (i.e., carburetor and ignition system) are a straight-across swap.

Something else has been added, the new engine is going to be a breaker and point engine instead of the CDI ignition. I think I detect the fine Italian hand of Dario Brisighella in that decision. Dario is not wildly enthused about the change to CDI ignition and prefers the older, easier starting, points system, despite its need for occasional maintenance.

For more information, you can contact Dario Brisighella at U.S. Quadra*

CONTROL TOWER

(Continued from page 34)

dual rate/exponential control toggle switches. The use of these switches is up to the particular tastes of the pilot, but the versatility for control is there.

The remaining top controls are the rudder/aileron mixer switch and mixing pot and the elevator/flap mixer switch and mixing pot. This is the way the rudder/aileron mixing takes place. When the rudder/aileron mixer switch is in the "MIX" position, the aileron control stick also moves the rudder. The amount of rudder mixing is determined by the rudder/aileron mixing trimmer. The rudder control stick is still active in the mixing mode and can be used to manually increase or decrease the amount of rudder being mixed. Obviously, when the A-R mix switch is in the Off position, no coupling takes place.

In the case of the flap/elevator mixing switch, when the flap mixing switch is On, the flap (Aux. 1) is coupled with the elevator. The amount of mixing is determined by the flap/elevator mixing trimmer. (Maximum is clockwise.) When the flap mixing switch is Off, the flaps and elevator controls are independent of each other. That completes the transmitter top controls.

The balance of the transmitter controls are on the right side. At top right is the throttle control. Remember the throttle trim is on the front panel in the upper left stick quadrant. Below the throttle control is the retract switch—direction is controlled by the position of the back panel servo reverse switch for Channel 5.

Below the retract switch is the rudder D/R switch. It functions in the same fashion as the aileron and elevator D/R controls. There is a 3-position switch, Lin/Exp/Low, and a trimmer pot. This control acts in the same fashion as the previously described Aileron/Elevator DR controls.

The last control on the lower right side is the trainer control system. It consists of two switches, a slide action switch, which has two positions, "Inhib" (inhibit) and "Act" (active). In order to use the trainer system, the slide action switch must be set to active and the second switch, a toggle type, must be held toward the front of the transmitter case.

Here's how it works. The system will allow training novice fliers without the risk of crashing a model. Control transfer from the slave (novice) to the master transmitter is instantaneous, thus the instructor controls the master transmitter and can take over in case the student gets into trouble. The master transmitter *must* be on the same frequency as the receiver in the model. The slave transmitter doesn't have to have the same frequency or the same mode. The transmitter power switch of the slave unit *must* be in the Off position. Insert the trainer cord (JRTC001, not provided) into the direct servo controller (DSC) jack on the rear of the master transmitter. Insert the other end of the trainer cord into the DSC jack of the slave transmitter. The slave transmitter left pilot light should come on.

Next, turn the master transmitter on. To transfer control to the slave unit, depress the spring-loaded trainer toggle switch on the master toward the front of the transmitter and hold it in that position. As long as the toggle switch is held in that position, the slave unit will maintain control and all transmitter functions of the slave unit will be active. If there is trouble, the toggle switch is released and the master unit takes over control immediately. Again, the slave transmitter power switch should be in the Off position. It's always smart to test the master/trainer system *before* flying to verify proper operation.

Okay, let's move to the controls at the rear of the transmitter. You'll notice there are two removable black plastic strips directly below the transmitter frequency module. They can be removed by pressing them down and out from the top. Behind the covers are additional transmitter controls.

At the top you have, left to right, transmitter charging jack, throttle, aileron, elevator, rudder, landing gear, Aux. 1 and Aux. 2 servo-reversing switches, and finally the direct servo controller (DSC) jack. This feature allows the user to operate the system without the need of transmitting. This is very useful at the flying site when there might be need to operate the controls while someone else is flying on your frequency. This function is also very handy when initially setting up your model.

When operating the DSC, the transmitter's power switch is Off and the receiver is On. When you plug the DSC cord into the transmitter's DSC jack, the encoder is automatically switched on, and only the left pilot lamp is lit. It should be noted that both charging jack and DSC jack are accessible without removing the upper rear panel.

or in Canada, contact Trinden Marketing Ltd*.

Dick Phillips, c/o *Model Airplane News,* 632 Danbury Rd., Wilton, CT 06897.

**The following are the addresses of the companies mentioned in this article:*

U.S. Quadra, 1032 E. Manitowac Ave., Oak Creek, WI 53154.

Trinden Manufacturing, Ltd., 575 Clarke Rd., London, Ontario, Canada N5V 2E1. ■

SOARING NEWS

(Continued from page 93)

Write or call him and mention *M.A.N.* and "Soaring News," please.

R/C Design & Development* has some Schempp-Hirth (scissor-type) spoilers that are really dive brakes, and very, very effective. They are made out of anodized aluminum and are about 14 inches long and 1 inch high. They work with a simple push-pull linkage, and can be modulated to give you just the exact amount of lift-loss you need to get you out of a killer thermal, or to drop the sailplane in at your feet on landing.

One nice feature is that they have holes in the blades so that they won't buffet when applied. Also, you'll find that these spoilers leave only the narrowest slot in the wing, reducing the loss of efficiency. You can put a piece of balsa on top of the blade and sand it to wing contour for a perfect fit. Tell Ron Carter I sent you, okay?

I'll see you all next month, hear?

Jim Gray, c/o *Model Airplane News,* 632 Danbury Rd., Wilton, CT 06897.

**The following are the addresses of the companies mentioned in this article:*

Howard Metcalf Models, 15 Brownlow Ave., Southampton, S02 7BX, England.

Aerospace Composite Products, 28 Crosswood Rd., Farmington, CT 06032.

Viking Models USA, 2026 Spring Lake Dr., Martinez, CA 94553; 415-689-0766.

Scale Model Research, 418 E. Oceanfront, Newport Beach, CA 92661.

R/C Design & Development, 821 Stubbs, Provo, UT 84601. ■

FUEL SYSTEMS

(Continued from page 39)

your fuel tank? Close off the vents and blow into the pickup line while the tank is immersed in water. If you see any bubbles, you have a problem.

Mounting a tank is another consideration that we seem to take for granted. If your model is built from a kit, chances

are the tank location is already set out for you. Even with that, the rule is to try and keep the centerline of the tank on the same level as the needle valve and as close to the engine as possible. This is a compromise position due to the suction capabilities of our engines. When the tank is full, the engine will run slightly rich. When the tank gets to half level, it will be just right. When the level is low, the engine will run slightly lean.

Also, when mounting your tank you should try to shock-mount it to defray engine vibration and prevent the fuel from foaming. Always try to wrap your tank in foam rubber, or at least surround it with padding. Not only will this help dampen the vibration, it will act as a sponge should your tank spring a leak.

Fuel filters are another source of potential problems. If the filter is too fine, it can actually hinder the operation of the engine. Also, a filter is made to catch foreign material in the fuel or fuel tank and prevent it from reaching the needle valve and clogging it up.

Pumps are also affected by crud, so if you use a pump, place an in-line filter between the tank pickup and the pump. But by all means clean these filters regularly, for example after every flying session. Back-flushing only puts debris back in the tank and it will sooner or later end up again in the filter or in your engine. If any debris gets to your carburetor, chances are your engine will go sour on you. This can not only eventually ruin your engine by overheating it, but if the engine quits in a bad spot while your plane is in the air, it could even crash.

There are many different fuel system accessories on the market, and when used properly, they can be of great assistance. Items such as mixers, valves, fueler connections, and couplers all have a place. The thing to remember is that these products take for granted that you're using the proper installation techniques. In all cases follow the directions to the letter on any fuel-related accessory.

Sometimes we can be fooled. I once had a problem keeping my engine running evenly throughout a flight. It would

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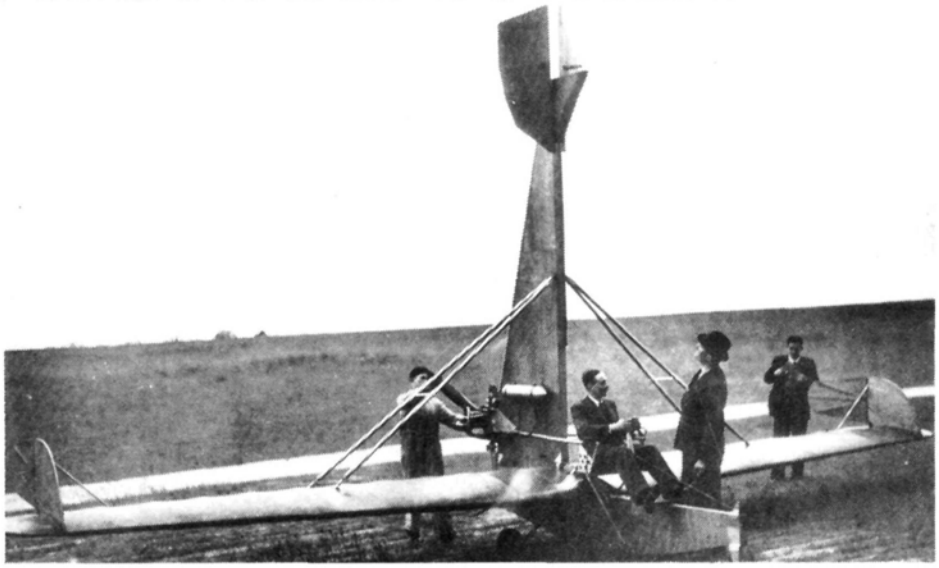
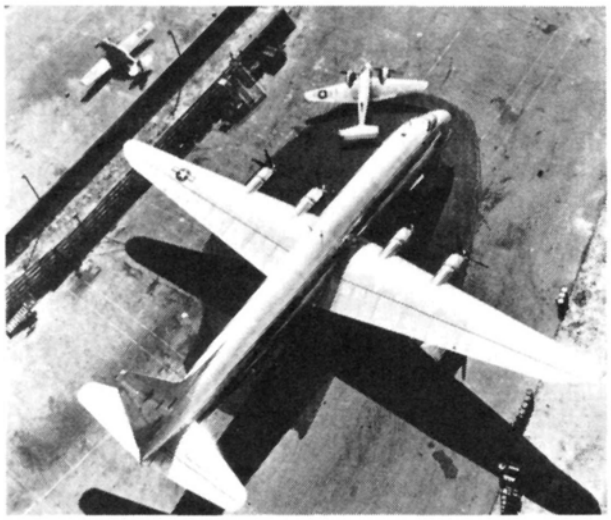
NAME THE PLANE CONTEST

Can you identify this aircraft?

If so, send your answer to: **Model Airplane News,** Name the Plane Contest (state issue in which plane appeared), 632 Danbury Rd., Wilton, CT 06897.





The winner will be drawn four weeks following publication from correct answers received by postcard delivered by U.S. Mail. If already a subscriber, the winner will receive a free one-year extension of his subscription.

Our mystery aircraft pictured in the May issue of *M.A.N.* was the Lockheed Constitution. Designated the X-60, it was developed under contracts by the U.S. Navy as a long-range transport. Commercial aviation was also an interested party, as the aircraft's performance and passenger-carrying capabilities were a desirable aspect of the design. It was able to transport 180 passengers non-stop from San Francisco to London at 300 mph. Roll-out from the Lockheed plant took place on August 22, 1946, and the 189-foot span transport took to the air in November of that year. The airplane was so large that a spiral staircase enabled access to the double decks, and there was a passageway in the wings so maintenance on the engines could be performed in flight. Two aircraft were built and they served with the Navy until 1955.

Congratulations to Ed Kolbaba of Dundee, Illinois, for correctly identifying this aircraft. Other correct entries were received from Bob Munroe, Jay Ray, Rick Tinkhauser, Frank Beatty, Scheuers Sobiech, and many others.

FUEL SYSTEMS

(Continued from page 124)

run lean, rich, quit, etc. I changed the tank, the fuel line, the fuel, the plug, and the carburetor, and tightened all the screws on the engine, all without any success. I came to find out I had a hairline crack below one of the mounting lugs on the engine causing a loss in suction at different crankcase temperatures.

Another time I had a leak at the base of the carburetor. The one I will never forget is the time I found a pin hole in the screw that retained the backplate to the engine. That engine gave me the nickname "one-minute Dan" because that was all the flight time I could get. It was on a Formula I Pylon Racer.

Also, if the head or glowplug on your engine is loose, it will not run right, leading you to believe you have a fuel-related problem. This also holds true with engines that run hot. If your engine is tight at the bottom end, either because you have a bad set of bearings or the crankshaft is not properly aligned, and it runs hot, you might suspect the fuel system when in fact your engine is the real problem. This is a hard thing to diagnose because a hot engine is usually only a symptom, but a good one in preventing a crash.

In troubleshooting a problem such as an engine that overheats or quits in flight, the first thing I check is the fuel pickup line from the tank. I seal off the vents and blow into the tank. If air passes through, I know I have a leak. If there is none, I put a little fuel in the tank and blow into the vent. If fuel comes out the pickup line, I know that the clunk line is working and is still on the fitting. So I have a good tank, right? Not necessarily. I can still have a pin hole in the line inside the tank; I could have a crack in the brass tubing inside the tank; or the clunk could be off the pickup line and floating on the surface of the fuel.

Moisture in a fuel tank can also be a problem. Nitromethane evaporates very quickly and, when it does, condensation forms. Condensation is water and doesn't burn too well! This is why you should flush out your tank regularly.

Of course, there are other things that can cause engines to run sour. A split coupling, a pin hole in the tank, or a leaky fitting can really tax our enjoyment of the hobby. Anything that is placed between the engine and the fuel adds to the complexity of troubleshooting a problem, and sometimes the obvious becomes a mystery Sherlock Holmes would be baffled by. But the first thing to go for is the obvious.

As I said in the beginning, the fuel systems we use on our models are in the Dark Ages of technology. A tank that is rigid, non-foaming, has positive flow, and is fool-proof is what we need. Any ideas?

**The following are the addresses of the companies mentioned in this article:*

Perry Aeromotive, Inc., 1568 Osage St., San Marcos, CA 92069.

Robart, 310 N. 5th St., St. Charles, IL 60174.

Sullivan Products, Inc., 533 Davisville Rd., P.O. Box C, Willow Grove, PA 19090. ■

LEO'S LASER

(Continued from page 29)

engine case and the canopy frame was spot-drilled to eliminate unnecessary metal. The extremes to which he will go to save a single pound are legend in the business. But weight is the name of the game, especially when one looks at how heavily vertical maneuvers figure in the scores.

For years Leo continued battling and winning against the biplane tide. Six-time national champion and former world champion...it's hard to argue with success. Now most of his competitors don't. Laser clones are everywhere, which is, they say, the sincerest form of flattery.

Although Leo is semi-retired from competition to concentrate on his air-show activities, even in his absence he still dominates the sport. He and his Laser have firmly established themselves as the standard by which *all* other aerobatic acts are judged and, to date, none have come close. ■

R/C NEWS

(Continued from page 62)

Sorry to say, but this continuing series of "R/C News" finally missed a month because I had to visit my friendly orthopedic surgeon. That's a break in a record of 17 years of columns; over 200 months of R/C as I see it. The interruption hurt but not so badly as did the surgeon's efforts! All is well now so I hope to see you out there flying soon!

Art Schroeder, c/o *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06897.

**The following is the address of the company mentioned in this article:*

Byron Originals, P.O. Box 279, Ida Grove, IA 51445. ■

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